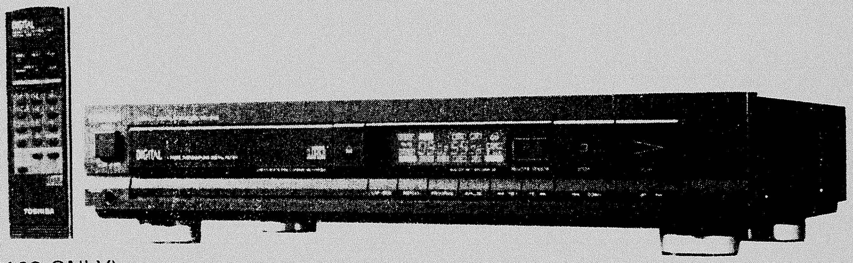
SERVICE DATA
FILE NO. 740-001

TOSHIBA

COMPACT DISC DIGITAL AUDIO PLAYER

XR-9118/9128



(XR-9128 ONLY)

CONTENTS

1 Explanation of subdivision and table of contents per page
2 Controls and technical specifications
3 Servicing hints, loading and cabinet parts
4 Servicing the CDM unit
5 Detailed measuring method, drawings and partslist of the servo-decoder panel
6 Wiring diagram
Drawings and partslist of control and display panel

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

Specifications are subject to change without notice.

CLASS 1
LASER PRODUCT
3122 110 03420

TE, TU, FR

PRINTED IN THE NETHERLANDS May, 1988 Ⓟ

EXPLANATION OF THE LAYOUT OF THE DOCUMENTATION

The documentation consists of chapters.
The number of the chapter is indicated by the first digit of the page number.
The second digit of the page number is the sequence numbering.

If modifications or supplements require new supplementary or replacement pages, the page number is extended with a third part:

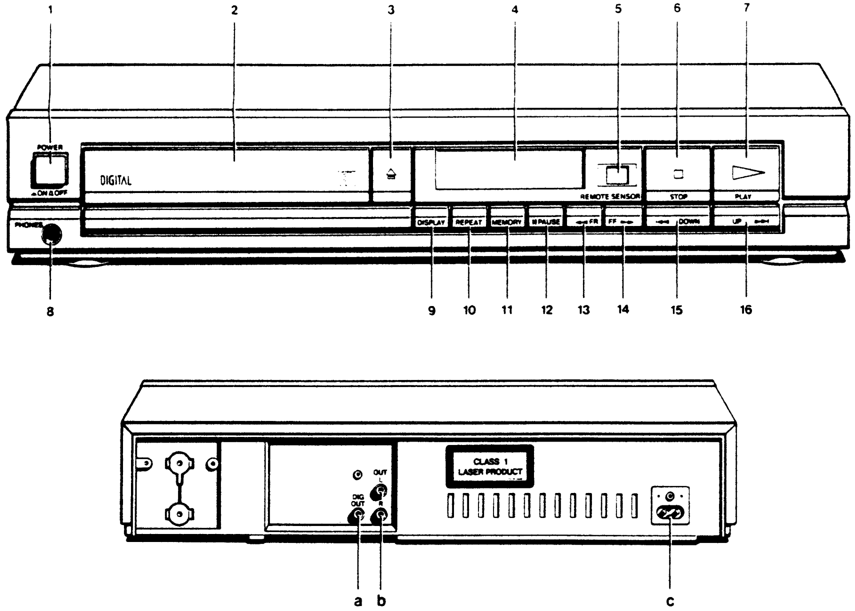
A digit behind the page number indicates that it concerns a supplementary page.
A replacement page is indicated by a letter behind the page number.

Example

3-6	is page 6 of chapter 3
3-6-1	is a supplementary page behind page 3-6
3-6-a	is the replacement page of page 3-6 (so page 3-6 can be removed from the documentation).

TABLE OF CONTENTS PER PAGE

Chapter	Page	Contents
1	1-1	Explanation of the subdivision of the documentation
		Table of contents per page
2	2-1	Summary of controls
	2-2	Technical specification
3	3-1	Servicing hints
		Service tools
	3-2	Disassembly of top cover
		Servicing of the front panel
		Demounting the CDM
		Replacement of transformer fuse
		Servicing of servo + decoder panel
		Servicing of tray mechanism
		Service disc–holddown
	3-3	Exploded view tray mechanism
		Partslist of cabinet and tray mechanism
	3-4	Exploded view of cabinet
4	4-1	Servicing the CDM unit
	4-2	Servicing hints
	4-3	Servicing hints
	4-4	Measurements and adjustments
	4-5	Measurements and adjustments
	4-6	Exploded view CDM
		Partslist of CDM
	4-7	Motor circuit
	4-8	Personal notes
5	5-1	Detailed measuring method for the servo + decoder circuit
	5-2	Detailed measuring method for the servo + decoder circuit
	5-3	Detailed measuring method for the servo + decoder circuit
	5-4	Detailed measuring method for the servo + decoder circuit
	5-5	Detailed measuring method for the servo + decoder circuit
	5-6	Detailed measuring method for the servo + decoder circuit
	5-7	Detailed measuring method for the servo + decoder circuit
	5-8	Detailed measuring method for the servo + decoder circuit
	5-9	Block diagram
	5-10	Circuit diagram servo
	5-11	Drawing of servo + decoder panel
	5-12	Drawing of servo + decoder panel
	5-13	Circuit diagram decoding 1
	5-14	Circuit diagram decoding 2
	5-15	Electrical partslist decoder panel
6	6-1	Wiring diagram
	6-2	Control and display circuit
	6-3	List of symbols
	6-4	Partslist of chip components



44 000 A11

TECHNICAL DATA

System	: Compact Disc Digital Audio system
Mainsvoltages	: 110 V, 127 V, 220 V 240 V ± 10% (to changed by transformer connections)
Mains frequencies	: 50-60 Hz (no adaption required)
Power consumption	: 14 W
Frequency range	: 2 Hz + 20 kHz ± 0.05 dB
Output voltage	: max. $2\ V_{rms}$/≥ 10 kΩ
Output inpedance	: 200 Ω
S/N ratio	: ≥ 96 dB
Chanell separation	: ≥ 93 dB
Total harmonic distortion	: ≤ 0.003 % (-90 dB)
Intermodulation distortion	: ≤ 0.003 % (-90 dB)
De-emphasis	: 0 or 15/50 µs (switched by the subcode on the disc)
Dimensions wxhxd	: 420 × 300 × 80 mm (tray closed) 420 × 425 × 80 mm (tray opened)
Weight	: approx. 2.9 kg
Headphone	
– Output voltage	: max. 5.6 Vrms
– Output impedance	: 150 Ω
– Load impedance range	: 8 Ω - 2 kΩ
– Output power	: 30 mW at 32 Ω

SUMMARY OF CONTROLS

Front of player

1 POWER switch: for switching the player on and off.
2 Disc tray: holds the Compact Disc.
3 △ button: for opening and closing the disc tray.
4 Display: functions as on/off indicator; gives infomation about the number of tracks on the disc, the playing time, the progress of play and particular functions of the player; also signals faults during operation or programming.
5 REMOTE SENSOR: for receiving infrared signals from the remote control handset (XR9128 only).
6 STOP button: for stopping play: also erases a program from the player's memory.
7 PLAY button: for starting play and retuning to the beginning of a track.
8 PHONES socket: for connecting headphones to listen to discs without using an amplifier.
9 DISPLAY button: for switching between the elapsed time of the current track and the remaining time of the whole disc on the display.
10 REPEAT button: for repeating a disc or program.
11 MEMORY button: for storing details when compiling a program and for reiewing and checking a program. The contents of the program are displayed one by one.
12 PAUSE button: for holding play at the start of a track or passage, or interrupting play.
13 ◀◀ FR button: for search backwards to a particular passage.
14 FF ▶▶ button: for search forwards to a particular passage.
15 ⏮ DOWN button: for returning to an earlier track during play.
16 UP ⏭ button: for moving on to a later track during play.

Rear of player

a OUT L/R sockets: output for connection to you audioamplifier.
b DIG OUT socket: output for digital signal proce or future developments such as CD-I.
c Mains connection socket: for connecting the m lead.

SERVICING HINTS

ESD

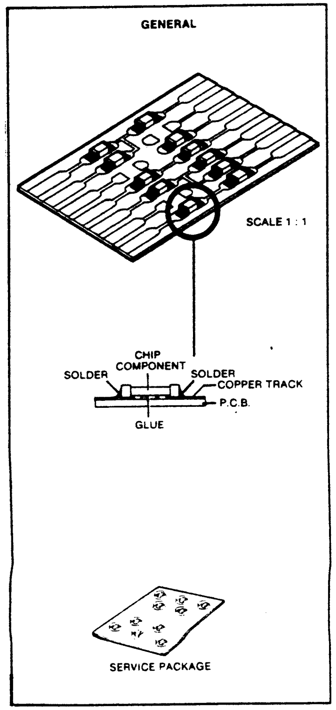
All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD).
Careless handling during repair can drastically reduce life expectancy.
When repairing, make sure that you are connected via a wrist wrap with resistance to the same potential as the chassis of the set. Keep components and aids also at the same potential.

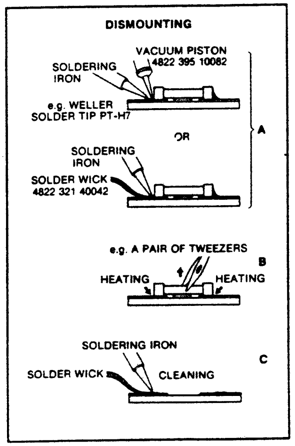
In the set chip components have been applied.
For disassembly and assembly of chip components see the figure below.

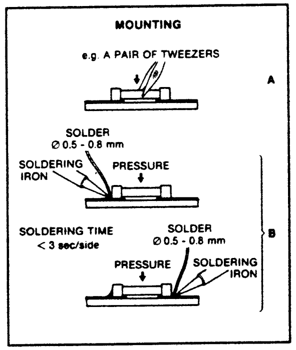
The disc should always rest properly on the turntable.
To achieve this a disc hold-down has been mounted in a bracket of the tray mechanism.
If the tray mechanism has to be disassembled for servicing, a separate disc hold-down should be used. For a service disc hold-down see page 4-3

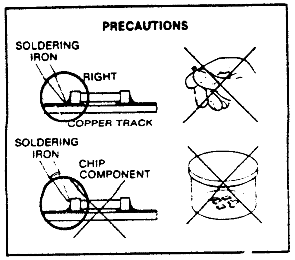
SERVICE TOOLS

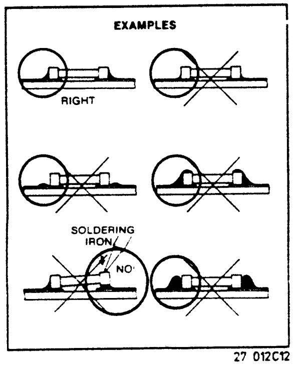
Part no.	Reference no.	Description
22105399	4822 397 30085	Audio test disc 3
22105400	4822 397 30096	Audio test disc 5+5A
22105401	4822 397 30155	Adio test disc 1 kHz
22999862	4822 395 50145	Torx screwd straight
22999863	4822 395 50132	Torx screwd square
22153583	4822 395 30204	13th orde filter
22197184	4822 322 40066	Service cable (14p)
22197185	4822 267 50676	Service conn. (14p)
22119498	5322 130 32182	LED green CQYG11
22197186	4822 321 21284	Service cable (4p)
22999865	4822 395 90204	Glass disc


GENERAL
SCALE 1 : 1
CHIP COMPONENT
SOLDER
SOLDER
COPPER TRACK
P.C.B.
GLUE
SERVICE PACKAGE


DISMOUNTING
VACUUM PISTON 4822 395 10082
SOLDERING IRON
e.g. WELLER SOLDER TIP PT-H7
OR
SOLDERING IRON
SOLDER WICK 4822 321 40042
A
e.g. A PAIR OF TWEEZERS
B
HEATING
HEATING
SOLDERING IRON
C
SOLDER WICK
CLEANING


MOUNTING
e.g. A PAIR OF TWEEZERS
A
SOLDER
Ø 0.5 - 0.8 mm
SOLDERING IRON
PRESSURE
SOLDERING TIME
< 3 sec/side
SOLDER
Ø 0.5 - 0.8 mm
B
PRESSURE
SOLDERING IRON


PRECAUTIONS
SOLDERING IRON
RIGHT
COPPER TRACK
SOLDERING IRON
CHIP COMPONENT


EXAMPLES
RIGHT
SOLDERING IRON
NO

27 012C12

DISASSEMBLY OF TOP COVER

- Remove the 4 screws out of side walls of top cover.
- Take top cover from set.

SERVICING OF THE FRONT PANEL

Disassembly of front panel

- Remove top cover.
- Remove the front (position 209) of the tray.
- Remove the screw from the headphones PCB.
- Remove the 3 fixing screws at upper side of fornt panel.
- Now the front panel can be taken off.
- Ensure during mounting that the 3 bosses of the set frame engage with the appropriate holes of the frontpanel.

Disassembly of control + display panel

- The control and display panel can be detached by removing the 9 screws 3Mx16 at the bottom of the display panel.
- Then the control + display panel can be taken out of the front.
- When mounting, make sure that the 3 bosses on the front slip into the appropriate holes in the PCB.

SERVICING OF THE TRAY MECHANISM

- Demounting the tray mechanism.
- Remove the top cover.
- Remove the front.
- Push the tray out of the mechanism.
- Remove the screw from the bottom of the set.
- Undo the 3 screws with which the loading has been mounted into the set. Two screws are situated in front and one in the centre at the rear.
- Lift the tray mechanism a little and undo the flexible PCB from the connector by lifting the upper part of the connector and taking the flexible PCB out Short circuit the connections by means of a paperclip. **(E.S.D.)**
- Undo the 2 stocko connectors.
- Now take the tray mechanism out of the set.

DEMOUNTING THE CDM

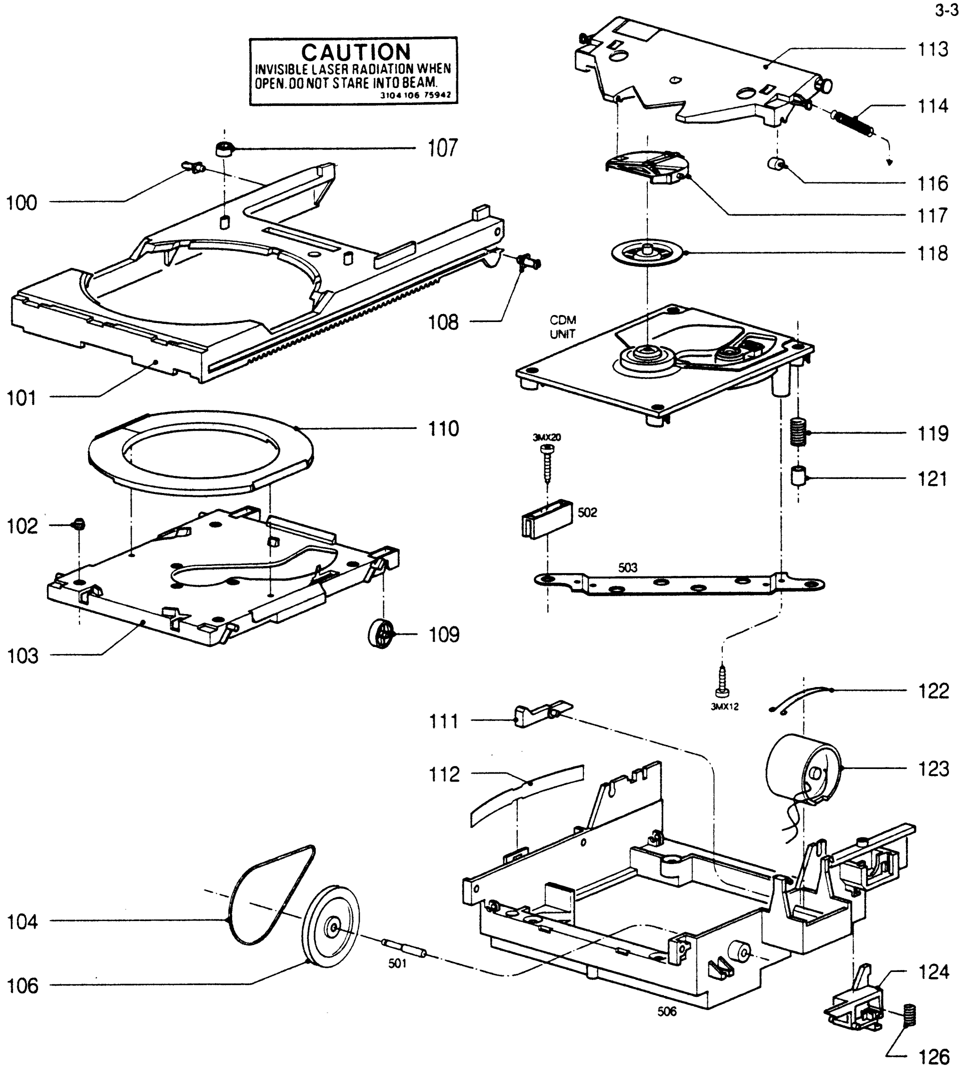
- Remove the complete disk hold-down.
- Turn the loading upside down.
- Support the CDM.
- Loosen the 2 screws on the metal bracket with which the CDM is suspended.
- The CDM can now be removed.
- For servicing the CDM see chapter 4.
- Mounting is done in reverse order.

SERVICING THE SERVO + DECODER PANEL

- Remove top cover.
- Remove the front panel.
- Remove the tray mechanism.
- Remove the screw with which the chassis part is fixed.
- Remove the screw in the rear with which the CINCH sockets are fixed.
- Remove the 2 screws on the PCB.
- Remove the screws from the transformer.
- The PCB now can be taken out.
- Mounting is done in reverse order.

REPLACEMENT OF TRANSFORMER FUSE

- For replacing the transformer fuse the transformer must be desoldered from the main panel.


CAUTION
INVISIBLE LASER RADIATION WHEN
OPEN. DO NOT STARE INTO BEAM.
3104 106 75942
107
100
101
108
110
102
103
109
104
106
501
113
114
116
117
118
CDM
UNIT
3MX20
502
503
119
121
3MX12
122
111
112
123
124
126
506

EVA.00611
T33/820

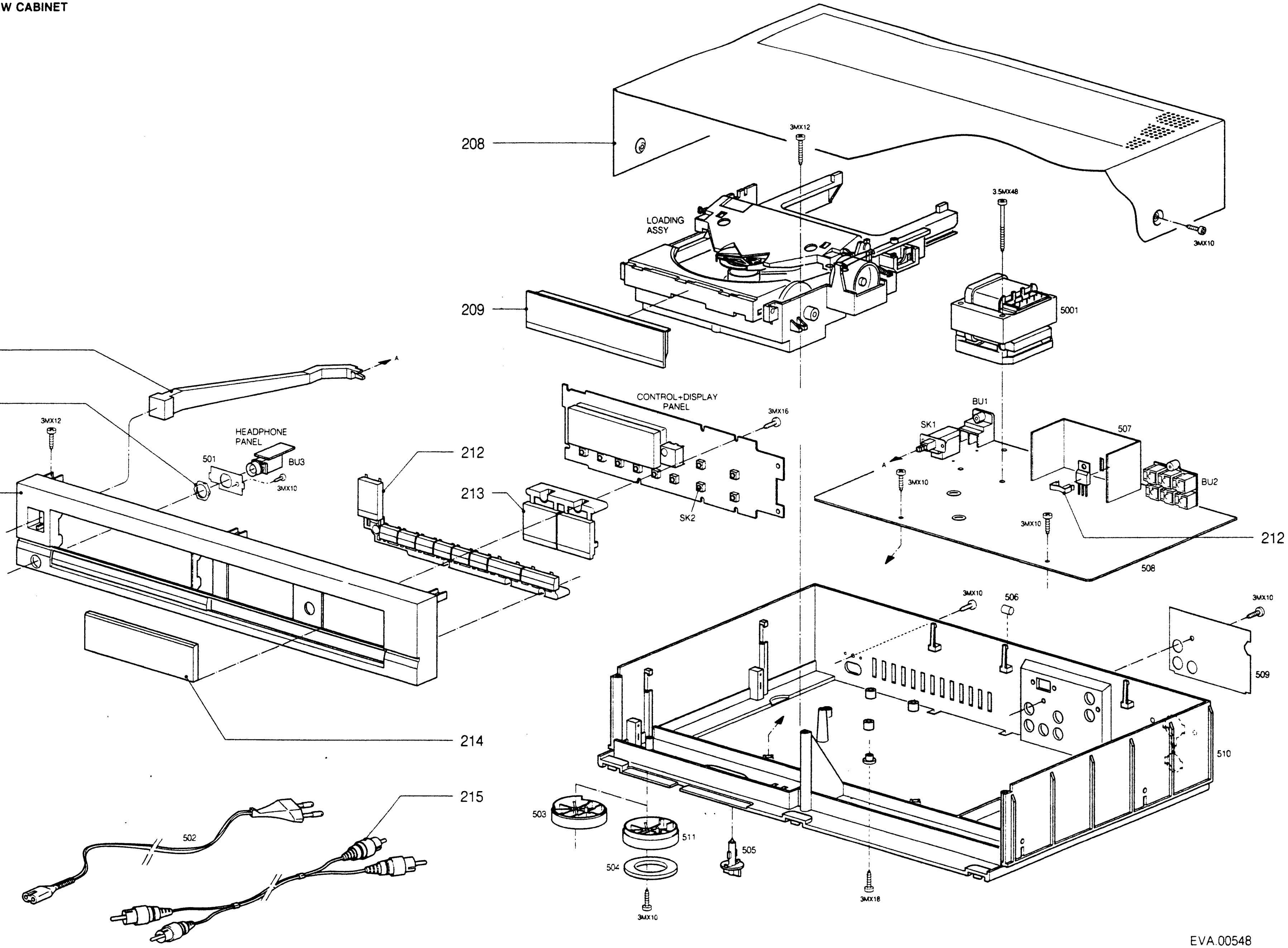
PARTSLIST OF TRAYMECHANISM

Loc. no.	Part no.	Reference no.	Description
100	20748554	4822 402 61081	Guide. Left
101	25792467	4822 444 50582	Tray
102	25767006	4822 325 60317	Grommet
103	20778244	4822 466 82352	Plate
104	25759176	4822 358 10115	Belt. driving
106	20727297	4822 522 32359	Wheel. Gear
107	22766450	4822 532 51518	Ring. Rubber
108	20748555	4822 402 61132	Guide, Right
109	20748557	4822 528 90638	Roller
110	20971094	4822 466 92227	Disc. adaptor for 8 cm
111	20754430	4822 402 61107	Lever
112	25779777	4822 492 63659	Spring. Blade
113	20754431	4822 444 60467	Lid
114	25770220	4822 492 32762	Spring. Tension
116	20748556	4822 528 90639	Roller
117	20754433	4822 532 11547	Carrier
118	20754432	4822 462 50383	Ring
119	25777835	4822 492 51902	Spring. Compress.
121	20844307	4822 466 61587	Foam
122	25777837	4822 492 63746	Spring. Clamping
123	25792468	4822 361 20998	Motor
124	20754429	4822 402 50244	Bracket
126	25777836	4822 492 51935	Spring. Compress.

PARTSLIST OF CABINET (see also page 3-4)

Loc. no.	Part no.	Reference no.	Description
201	22829107	4822 701 10693	Front (XR-9128)
201	22829106	4822 444 40262	Front (XR-9118)
204	22885133	4822 701 10698	Button. Push
208	22801178	4822 444 60521	Cover
209	22829108	4822 701 10696	Front
212	22885135	4822 701 10695	Button. Push
213	22885134	4822 701 10694	Button. Push
214	22887009	4822 701 10697	Lens (XR-9128)
214	22887010	4822 381 11013	Lens (XR-9118)
215	22197183	4822 321 22603	Cable. Connect
217	25779778	4822 492 63076	Spring. Clamping
502	22176797	4822 321 10457	Power cord (Europe)
502	22176798	4822 321 10522	Power cord (UK)
5001	22225122	4822 146 30615	Transf. Mains

EXPLODED VIEW CABINET


208
3MX12
LOADING ASSY
3.5MX48
3MX10
209
5001
204
A
205
3MX12
HEADPHONE PANEL
501
BU3
3MX10
201
CONTROL+DISPLAY PANEL
3MX16
BU1
SK1
A
3MX10
507
212
213
SK2
BU2
3MX10
212
508
3MX10
506
3MX10
509
510
214
215
502
503
511
505
504
3MX10
3MX18

EVA.00548
T07-807

4. SERVICING THE CDM UNIT

Technical data

General

- Application: Compact Disc "Home Player"
- Single-stage radial and balanced actuator for track following
- Track following error detection method : Push-Pull
- Focus error detection method : Double Foucault
- Dimensions: 130 x 100 x 44 mm
- Weight : abt. 270 grams

Radial actuator

- Swing angle: 72°
- Diameter readout range: from 47.4 mm ± 0.6 mm to 117.5 mm ± 0.5 mm
- Squareness relative to turntable: 90° ± 0.4°
- Bearing friction: 0.75 mNm max.
- Total ohmic resistance of the coils: 20 Ω ± 2 Ω
- Maximum allowable voltage: 14V/DC continuous
- K factor: 0.019 Nm/A (± 20%)

Focus actuator

- Vertical amplitude: 1.9 mm ± 0.2 mm
- DC voltage across the focus motor in focus: nom. 0V; max. ± 1,2 V.
- Sensitivity: 21 mm/A
- Ohmic resistance: 23.5 Ω ± 2.5Ω
- Maximum allowable voltage: 8V/DC continuous

Laser diode LTO 22MC

- Wave length: 780 nm ± 10 nm
- Light energy: 3 mW
- Voltage across the diode at 3mW: typical = 1.75 V, max. = 2.2 V

Turntable motor

- Hall motor

SERVICING HINTS

To prevent loose metal objects from getting in the CD mechanism, it will be necessary to see to a clean repair station.

The objective can be cleaned with a blow brush.

When effecting repairs to, or making measurements on the CD mechanism, be careful not to damage the flat springs of the focusing unit.

ESD

THE PHOTODIODES AND THE LASER ARE MORE SENSITIVE TO ELECTROSTATIC DISCHARGES THAN MOS ICS.
CARELESS HANDLING DURING SERVICING MAY REDUCE LIFE EXPECTANCY DRASTICALLY.
FOR THIS REASON CARE SHOULD BE TAKEN THAT DURING SERVICING THE POTENTIALS OF THE AIDS AND YOURSELF ARE EQUAL TO THAT OF THE SCREENING OF THE SET.

For measurements and adjustments it is possible to position the working mechanism outside the set.
For this purpose, an extension cable can be made from the following parts.

- Service flat cable (14-pole)	4822 322 40066
- Service connector (14-pole)	4822 267 50676

These two items should be used to assemble an extension cable between the connector and the flex cable of the CDM unit.
The two connections to the motor should be lengthened with loose wires.

Remark: The service cable should be assembled as follows; (see Fig. 1)

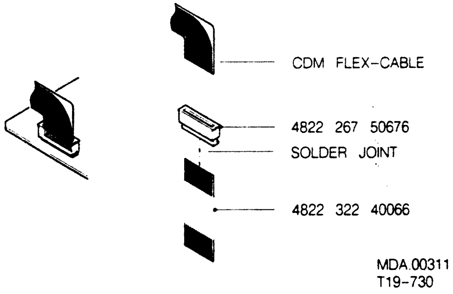


Fig. 1.

Demounting the Rafoc unit

- Take the CD-mechanism out of the set.
- Remove the flexible PCB from the connector on the PCB by lifting the upper part of the connector and taking the flexible PCB out. (see Fig. 2)

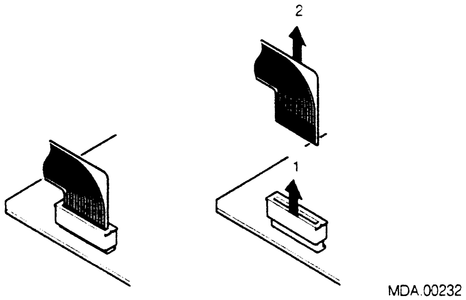


Fig. 2

- The RAFOC unit can be removed after the two fixing screws M3 x 25 have been loosened.
  Caution: when doing so, the two nuts M3 on the upper side of the CD mechanism come loose.
- Now the pivot plate, item no. 56, can be removed.
- After removing the clamping piece, item no. 51, the RAFOC unit/flexible PCB assembly can be taken out.
  Attention: when mounting the RAFOC unit, see to it that the flexible PCB reset well against the mounting plate at the height of the clamping piece (item no. 51).
  In some cases, after exchanging the RAFOC unit/flexible PCB assembly, it may be necassary to glue the flexible PCB with a fast-drying glue to prevent the RAFOC unit from rubbing against the flexible PCB.
  The glueing should be done very carefully.
- When the laser and/or the monitor diodes are defective, it will be necessary to replace the complete CDM unit.
- After mounting the RAFOC unit you should make sure that the arm runs clear over the entire disc diameter.
  This can be checked by means of a spring-pressure gauge which is held against the magnet of the focusing unit.
  The friction of the arm, measured over the entire meter reading, may not be greater than 25mN.
- A fast check of the clearance of the arm is possible in service position 0.
  For servicing positions see the service manual of the set.
- After mounting, the angle setting should be adjusted.

Replacing the flexible PCB item 54

- Demount the RAFOC unit.
- Desolder the connections A (see Fig. 3) of the flexible PCB.

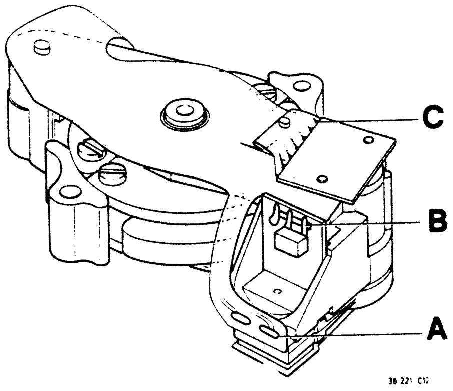


Fig. 3

- Before desoldering the connections C of the photodiode PCB, the positions of the connecting points of the photodiode PCB should be marked, so that afterwards the PCB can correctly be replaced.
- Now the 6 connections C of the photodiode PCB can be desoldered by heating the pins C one by one until the flexible PCB comes loose.
  This should be done very carefully.
- Desolder the 4 connections of the radial coils.

Mounting the flexible PCB (item 54).

- Solder the 4 connections of the radial coils.
- Apply the connections A and B (see Fig. 3).
- Before the 6 connections of the photodiode PCB can be soldered, they should be provided with an extra coating of tin.
- Place the flexible PCB under the photodiode PCB.
- In order to hold this position, the flexible PCB may be supported (for example by an expanded paper-clip between the arm and the underside of the flexible PCB).
- Then the 6 connections C can be heated so that they become soldered to the photodiode PCB.

Replacing electrical components

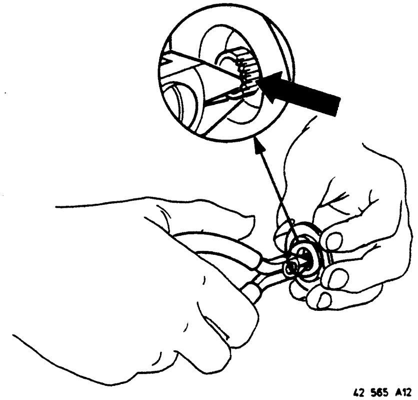
- If one of the following components is defective: photodiodes, laser diode, focus motor, radial actuator turntable motor, the entire CDM unit should be replaced.

A service disc-holddown

The disc should always bed down well on the turntable.
If the mechanism has to be dismounted for repair, a service disc-holddown should be used.
The CD mechanism then can function normally as in the set.

Compose a service Disc hold-down in the following way

- Cut in the most inner ring of a disc hold-down (4822 462 50383) with small and sharp nippers. See fig. below.
- Enlarge the diameter of the innermost ring slightly with the hind part of a pencil of ballpoint, so that it jams onto the turntable with sufficient force.
- If the jamming force decreases after a certain time of use, the diameter has to be enlarged with a pencil or ballpoint again.



Replacing chip components

Leadless components have been applied in the set.
For the insertion and removal of leadless components see the figure on page 3-1.

MEASUREMENTS AND ADJUSTMENTS

Checking the angle setting

The angle setting can be checked with the glass-disc method which is explained below.

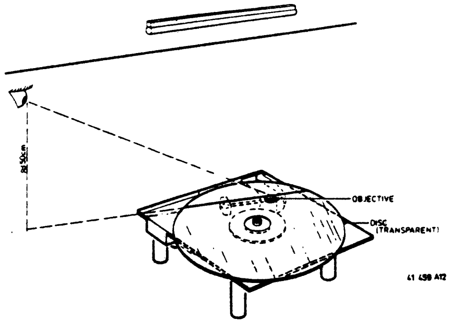


Fig. 4

Put glass disc 4822 395 90204 on the turntable.
Make sure that the glass disc beds down well on the turntable.
Place the CD mechanism under a light source, under which there is a straight line (e.g. under a fluorescent tube with grid).
Set the arm to mid-position of its radial track.
Turn the mechanism until the arm is parallel to the line under the light source (see figure below).
Look into the direction and in the extension of the line to the reflection thereof on the glass disc and in the objective.
Locate the CDM in such a way that the line reflected by the glass disc runs across the centre of the objective.
The line reflected by the objective should fall just within the surface of the objective. If this is the case, the two lines are not more than 4 mm apart and squareness is correct.

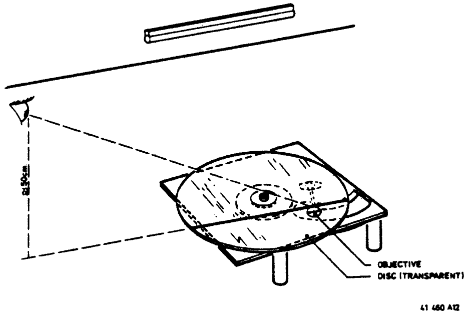


Fig. 5

Turn the CD mechanism through 90° relative to the previous position. The arm must be kept in mid-position (see figure above).
Repeat the previous check.

Adjusting the angle setting

For adjusting the angle settig one or both of the two locking knocks for the bearing plate on pos. 59 must be broken.
If a check on the angle setting shows that the angle falls outside the tolerance, the angle should NOT be adjusted for minimum deviation, but it should be adjusted within the tolerance.
The new setting should lie between the old setting and the optimum setting. After adjusting the setting, the friction of the arm must be checked. This is done by means of a spring pressure gauge which is held against the magnet of the focusing unit.
The friction of the arm, measured over the entire meter reading, should not be greater than 25 mN.
When the friction appears to be too high, the RAFOC unit must be replaced and the angle between disc and light path adjusted.

The lock is adjusted as follows:

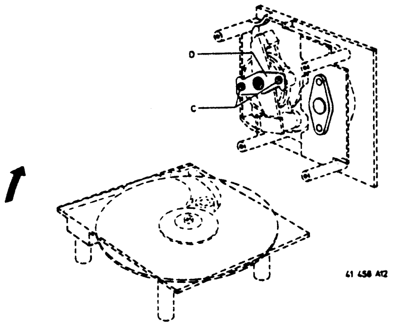


Fig. 6

Loosen screws C (see figure above) until bearing plate D can be displaced. Correct the angle setting by moving the bearing plate into the direction shown in figure below. Tighten screws C, ensuring that the setting does not drift. Then double check the setting in two directions.

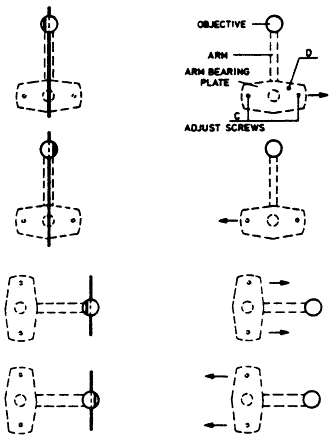
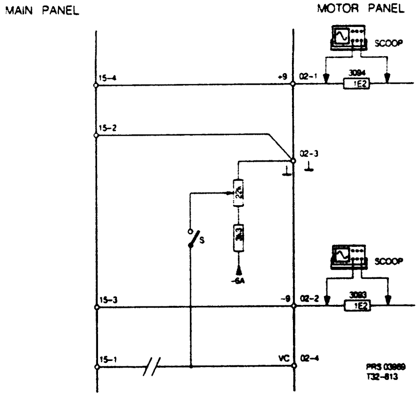
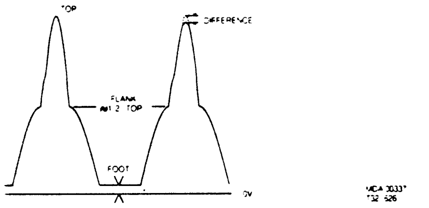


Fig. 7

Check of the motor control (Hall control) (see motor panel)



1. Interrupt the Vc connection by unsoldering the connector point 02-4 on the motor panel
2. Connect a trimming potentiometer of 22k Ohm + a resistor of 3k3 Ohm to the motor print between 02-3(⊥) and -6A supply on the main panel.
3. Connect the slider with 02-4(Vc) via switch S.
4. Measure with an oscilloscope first across 3094 and hereafter across 3093.
   Do not measure across both resistors at the same time, since the currents are measured through the +2 lead and −2 lead.
5. Put the trimming potentiometer in the maximum position (the slider is then connected to the resistor of 3k3 Ohm).
6. With a disc on the turntable, put the set in service–loop 0. Switch S on and adjust the trimming potentiometer back in such a way that 3 complete pulses are visible during 0.1 sec. (fig. 3). The polarity of the oscilloscope must be chosen so that the tops of the pulses are in upward position.
   The rotor magnet of the motor has 3 polespairs. Therefore the behaviour of the motor during one revolution with a speed of 600 r.p.m. is visible.
7. Measure with a DC–voltmeter on 02–4(Vc).
   A. $V_c = -1.7 +/- 0.5$ V.
   B. Measure across 3094, value 1 = maximum 56.4 mV.
   C. Measure across 3093, value 2 = maximum 58.8 mV.
   D. Difference: **(value 1 − value 2)** maximum 6 mV. If the difference exceeds 6 mV, while value 1 and value 2 are below the maximum the motor is then wrong!
8. For a good functioning the signal has to meet the following values:

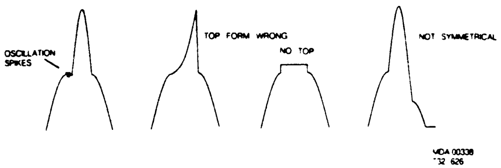


Top is not specified by value, see 7 (value 1 and value 2).

Top difference	<24 mV
Flank difference	<36 mV
Foot	is not specified

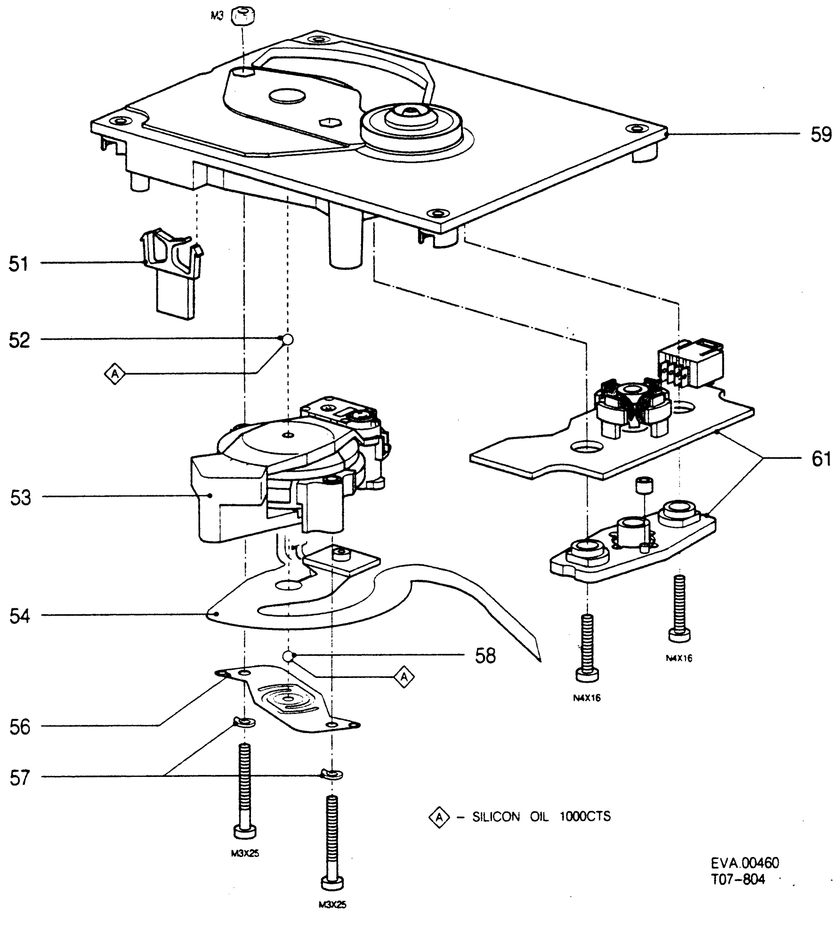
Remark:
Flank difference is at one asymmetrical pulse.
Foot is DC offset.

9. Examples of the wave form faults:



10. Adjust the voltage on 02–4(Vc) with the potentiometer back to −0,9 V. The motor must still turn. Although the top height is much lower now the wave form has to be symmetrical and rounded.

EXPLODED VIEW CDM

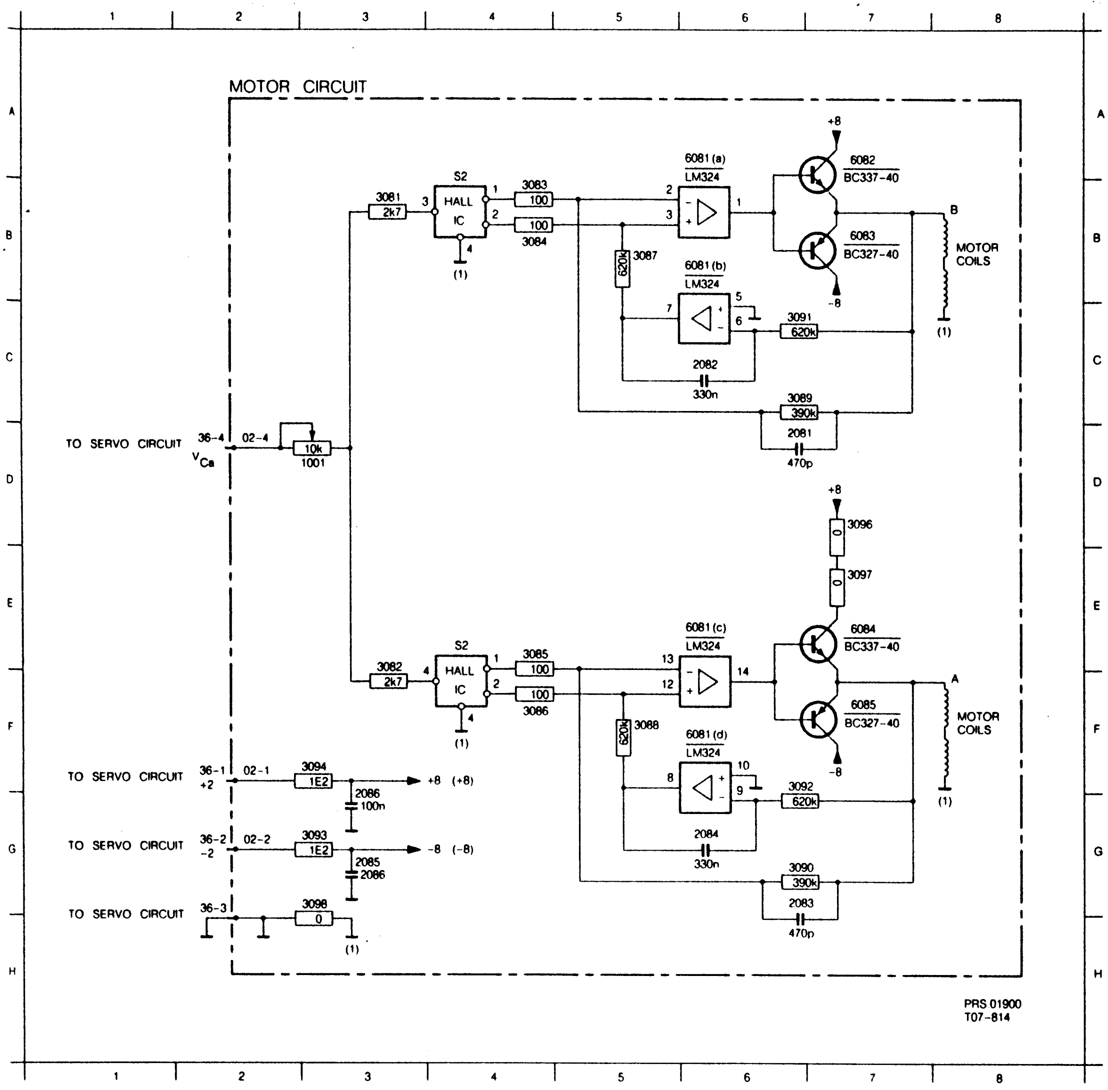

M3
59
51
52
A
53
61
54
58
A
N4X16
N4X16
56
57
M3X25
M3X25
A - SILICON OIL 1000CTS
EVA.00460
T07-804

Mechanism parts

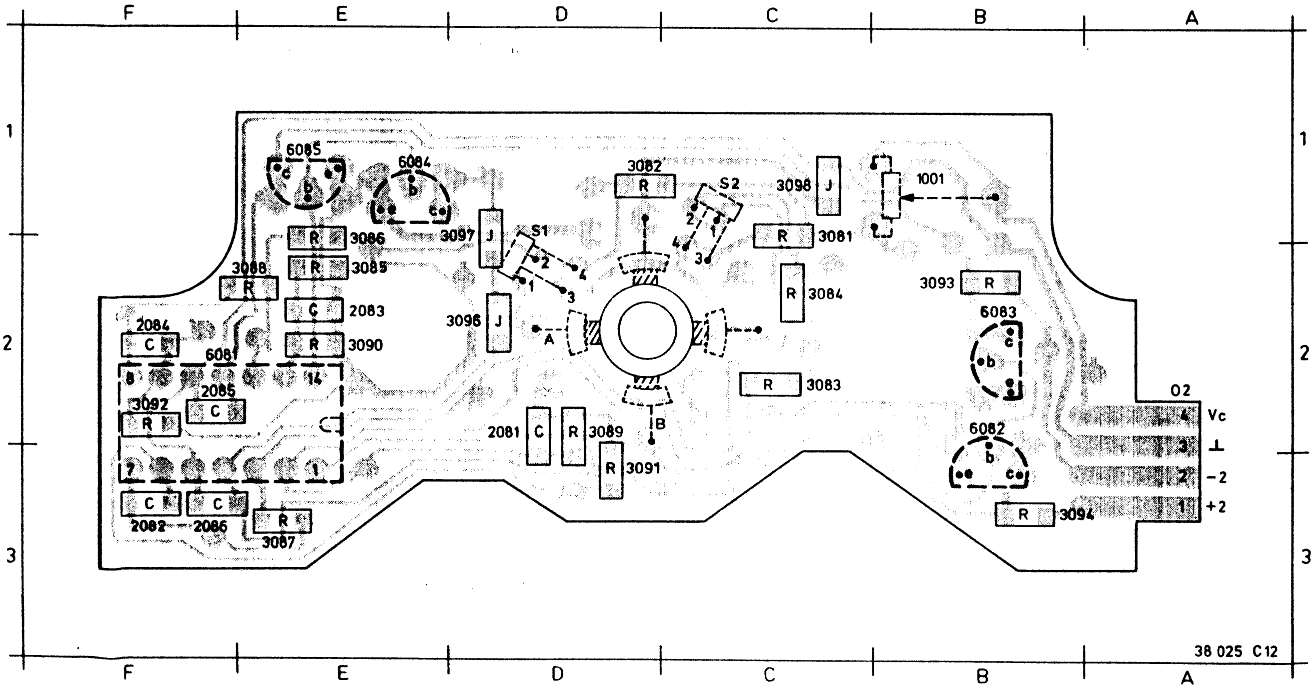
Loc no.	Part no.	Reference no.	Description
51	20776197	4822 492 63761	Flexible holder
52	25757140	4822 520 40177	Steel ball
A	22967138	4822 390 80145	Silicon oil, 1000CTS
54	22199419	4822 323 50124	Flexible P.C. board
56	20776198	4822 520 10555	Retainer, pick up
57	25766550	4822 530 80188	Wasner
58	25757140	4822 520 40177	Steel ball
51+61	25709789	4822 691 20464	Complete unit

MOTOR CIRCUIT

1001 D 3	2084 G 6	3082 E 3	3086 F 4	3090 G 6	3094 F 3	6081 A 6	6082 A 7
2081 D 6	2085 G 3	3083 B 4	3087 B 5	3091 C 6	3096 D 7	6081 B 6	6083 B 7
2082 C 6	2086 G 3	3084 B 4	3088 F 5	3092 F 6	3097 E 7	6081 E 6	6084 E 7
2083 G 6	3081 B 3	3085 E 4	3089 C 6	3093 G 3	3098 G 3	6081 F 6	6085 F 7


MOTOR CIRCUIT
1 2 3 4 5 6 7 8
A B C D E F G H
S2
HALL IC
3081 2k7
3082 2k7
3083 100
3084 100
3085 100
3086 100
3087 620k
3088 620k
6081 (a) LM324
6081 (b) LM324
6081 (c) LM324
6081 (d) LM324
6082 BC337-40
6083 BC327-40
6084 BC337-40
6085 BC327-40
MOTOR COILS
3091 620k
3092 620k
2082 330n
2084 330n
3089 390k
3090 390k
2081 470p
2083 470p
3096 0
3097 0
+8
-8
(1)
TO SERVO CIRCUIT 36-4 VCa 02-4
10k 1001
TO SERVO CIRCUIT 36-1 +2 02-1
3094 1E2
2086 100n
+8 (+8)
TO SERVO CIRCUIT 36-2 -2 02-2
3093 1E2
2085 2086
-8 (-8)
TO SERVO CIRCUIT 36-3
3098 0
PRS 01900
T07-814

MOTOR PANEL


F E D C B A
1 2 3
6085
6084
3086
3085
3088
3097
S1
3096
2084
2083
3090
6081
3092
2085
2082
2086
3087
3082
S2
3098
1001
3081
3084
3093
6083
3083
2081
3089
3091
6082
3094
02
Vc
⊥
-2
+2
38 025 C12

PERSONAL NOTES

5. DETAILED MEASURING METHOD FOR THE SERVO + DECODER CIRCUIT

Hints

Test disc

It is important to treat the test discs with great care. The disorders on the discs (black spots, fingerprints. etc.) are exclusive and unambiguously positioned. Damage may cause additional drop-outs, etc. rendering the intentional errors no longer exclusive. In that case it will no longer be possible to check e.g. the good working of the track detectors.

Measurements on op-amps

In the electronic circuit op-amps have been used frequently. Some of the applications are amplifiers, filters, inverters and buffers.

In those cases where in one way or the other, feedback has been applied the voltage difference at the differential inputs converges to zero. This applies to both DC and AC signals. The cause can be traced to the properties of an ideal op-amp ($Z_i = \infty$, $G = \infty$, $Z_o = 0$). If one input of an op-amp is directly connected to ground it will be virtually impossible to measure at the inverting and the non-inverting inputs. In such cases only the output signal will be measurable.

That is why in most cases the AC voltages at the inputs will not be given. The DC voltages at the inputs are equal.

Stimulation with "0" and "1"

During troubleshooting sometimes certain points should be connected to ground or supply voltage. As a result certain circuit can be brought in a desired state thus shortening the diagnosis time. In a number of cases the related points are outputs of op-amps. These outputs are short-circuit-resistant, i.e. they can be brought to "0" or ground without problems.
The output of an op-amp, however, should never be connected directly to the power supply voltage.

Measurements on microprocessors

Inputs and outputs of microprocessors should **never** be connected directly to the power supply voltage. The inputs and outputs should only be brought to "0" or ground if this is staed explicity.

Measurements with an oscilloscope

During measurements with an oscilloscope it is recommended to measure with a 1:10 test probe, since a 1:10 probe has a considerably smaller input capacitance than a 1:1 probe.

Selection of ground potential

It is very important to select a ground point that is as close as possible to the test point.

Conditions for injection

- Injection of levels or signals from an **external** source should **never** take place if the related circuit has no supply voltage.
  The injected levels or signals should never be greater than the supply voltage of the related circuit.

General checkpoints

In the detailed measuring method below a number of general conditions, required for a properly functioning set, will not be mentioned. Before the detailed measuring method is started, these general points should first be checked.

a. Ensure that disc and objective are clean (remove dust, fingerprints, etc.) and work with undamaged discs.
b. Check if all supply voltages are present and if they have the correct values.
c. Check the good working of the CD mechanism by means of the servicing programme.

Indication of test points

In the drawings of the diagrams and the panels the test points have been indicated by a number (e.g. ◇12) to which the measuring method refers. In the measuring method below, the symbol (◇) has been omitted for the testpoints indicated.

Initiation of the servicing programme of the μP

- **Servicing position "0"**

  Simultaneously depress the UP ⏭, FF ⏩ and LAP/REM buttons. Keep these three buttons depressed while the mains voltage is switched on.
  This is the STAND-BY mode, "0" appears on the display.

  In this state as in service position "1" and "3", it is possible to move the arm by means of the FF ⏩ and ⏪ FR keys with a minimum torque to the outside and the inside resp.
  This enables a check to the free motion of the arm across the disc.

  After depressing one of those keys the laser will emit light.

- **Servicing position "1"**

  From servicing position "0" the player can be brought in servicing position 1" by depressing the UP ⏭ key.

  In this state the laser emits light and the objective starts to focus. When the focal point has been reached, "1" appears on the display.

  When **no** disc has been inserted the objective goes 16× to and fro. Then the player reassumes servicing position "0".

- **Servicing position "2"**

  To be reached by depressing the UP ⏭ key after servicing position "1" has been reached.

The turntable motor starts to run

On the display appears "2".

When in service position "1" the arm is moved or the disk is moved roughly (disturbance of focus), the motor may start running at maximum speed in position "2".

By pressing the UP ⏭ key, the player can be brought back, via position "3", into position "0".

- **Servicing position "3"**

  To be reached by depressing the UP ⏭ key after servicing position "2" has been reached.

  The radial control is switched on. $\overline{\text{MUSB}}$ is high so that the music information **is released**.

On the display appears "3".
(Dependent on the length of the lead-in track music will be reproduced after approx. 1 min.).

In this state it is possible to move the arm by means of the SEARCH FORW and the SEARCH REV keys to the outside and to the inside resp. Now the motion is controlled by the μP and the arm moves by steps of 64 tracks as long as the key is depressed.

If the laser is disturbed in position "3" (as a result of braking or removal of the disk) the player will jump back to position "0". This also holds good if position "1" and "2" is disturbed and position "3" is called.

The servicing programme can be left by switching the mains switch (POWER ON/OFF) off and on (hardware reset).

Specification measurement

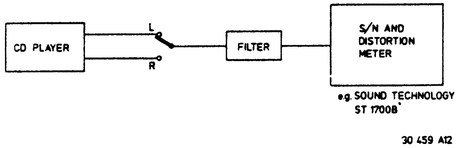


Fig. 4

To measure the specification use can be made of audio test disc 4822 397 30085.
Use 13th order filter 4822 395 30204 to measure (see Fig.4):
- Total harmonic distortion (THD)
- Intermodulation distortion
- Signal-to-noise ratio (S/N)

Continuous burning of the laser

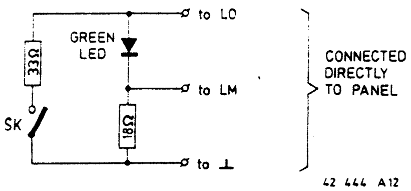
Bring the player in service position "0" and press a search button.
Now the laser will burn continuously, or
- Bridge capacitor 2583 on the decoding panel.
- Connect $\overline{\text{Si}}$ (= pin 20 of 6525 on the servo + preampl. panel) to ground.
- Switch on the supply voltage.
- Now the laser will burn continuously.

Note: **Danger**

Invisible laser radiation.
Avoid direct exposure to beam.

Check of the laser supply

The laser and, the laser supply in IC6525 plus the monitor diode form a feedback system.
A defect in the laser supply can result in the destruction of the laser.
If, in that case, the laser (= complete CDM unit) is replaced, the new laser will also become defective. However, it is impossible to check and repair a feedback system if a link is missing. For this reason the laser supply can be checked with the circuit below. The green LED replaces the laser, the voltage across the 18 Ohm resistor is feed back as monitor voltage, the 33 Ohm resistor and the switch serve to draw more current from the laser supply.



LED GREEN e.g. CQY 94 IV 5322 130 32182

The above circuit is connected to connector 11 via an extension cable instead of a flex print. The normal flex print is not suited for this purpose because of its high internal resistance.

Code no. extension cable 4822 322 40066

- Take the above flex print out of connector 11 on the PCB.
- Connect the circuit via the extension cable to the connector.
  Bring the player in service position "0" and press a play button, or
- Select the play mode by grounding $\overline{\text{Si}}$ (pin 20 of IC6525).
  Note: $\overline{\text{Si}}$ = 0, start initialisation low, is the play mode.
- Measure the voltage LO (Laser Out) at test point 9.

SK open:	1,8 V ≤ LO ≤ 2,3 V 170 Mv ≤ LM ≤ 220 mV The green LED emits little light.
SK closed:	1,8 V ≤ LO ≤ 2,3 V 170 Mv ≤ LM ≤ 220 mV The green LED emits little light.

- During the change over from SK closed to SK open, the LED will emit more light for a short moment.
- The control sees to it that the same amount of current flows through the LED when SK is open and when SK is closed.

At $\overline{\text{Si}}$ = 1, in the STAND-BY state, LO = 0 V ± 0,2 V.

Repair procedure

Since laser, monitor diode and photodiodes are very sensitive to static charges, care should be taken that during measurements and adjustments the aids and yourself have a potential that is equal to that of the CD mechanism.

Attention: When exchanging the CDM unit, the laser output potentiometer 3528 should be placed in mechanical mid-position to avoid damage to the laser.

Laser adjustment

- Measure the resistance of R3529 + R3528 with an ohmmeter and adjust potentiometer R3528 so that R3528 + R3529 have a combined value of 1 kΩ.
- Put test disc 5 on the turntable.
- Switch on the set and select the PLAY mode.
- Check if HF is present. If not, stop the measurement immediately and analyse the fault.
- If HF is present, play track 1 of test disc 5 and adjust the sum HF across R3508 (test points 1 and 2) to 50 mV with a DC voltmeter.

Adjustment of the focus off-set

Coarse adjustment

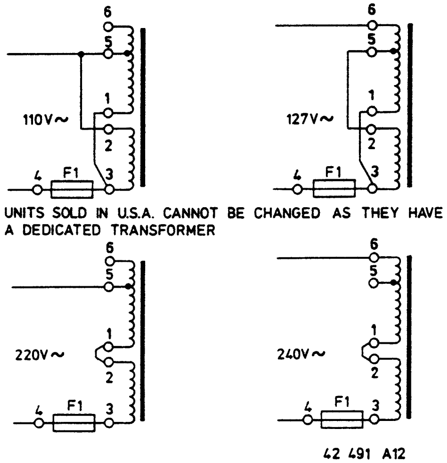
- Adjust the focussing motor to the eye for a horizontal position by means of potentiometer 3517.
- Here after the fine adjustment of the focus off-set has to be carried out.

Fine adjustment

- Bring the player in service position 2.
- Adjust potentiometer 3517 for a voltage across 2545 (test point 27) of 400 mV ± 40 mV.

Note: Notice that the CDM is in a horizontal position.

Changing the transformer connections



UNITS SOLD IN U.S.A. CANNOT BE CHANGED AS THEY HAVE A DEDICATED TRANSFORMER

Fig. 6

If the set should be connected to a mains voltage that deviates from the voltage mentioned on the type plate, the transformer connections should be changed, as indicated in Fig. 6.

DETAILED MEASURING METHOD

I. μP IC6551

- **Servicing program**

  For initiation of the servicing program see: General checkpoint: Initiation of the service program.

- **SK2**

  If the tray mechanism has to be demounted, and this undoes the operation of SK2, SK2 has to be interconnected.
  This means that pin 22 of the P (IC6551) is connected to ground.
  The set will then function normally, with the exception of the open/close function.

- **Reset (pin 17)**

  When the supply voltage is switched on, a positive pulse should be present.

- **X-tal out (pin 15; test point 31)**

  The frequency of this signal should be 6 MHz.

- **I^2C (pin 3; test point 29)**

- **I^2D (pin 2; test point 31)**

  These should be activity at test point 29 and 31 in position play.

- **$\overline{\text{MSTP}}$ (pin 21; test point 78)**

  When, after RD "high", the $\overline{\text{MSTP}}$ is "high" for a short moment (> 0.2 sec.), the turntable motor control will be switched on.
  The turntable motor is controlled by the MC-signal (test point 12).
  To check $\overline{\text{MC}}$, see: "Decoder A IC". To check the turntable motor control see CDM2 Service Manual "Checking of the motor control".

- **B0 (pin 11; test point 36)**
  B1 (pin 10; test point 34)
  B2 (pin 9 ; test point 33)
  B3 (pin 8 ; test point 32)

With the B0 + B3 signals
- The radial control is switched on.
- The level on the DAC output is controlled.
- In the SEARCH mode, there should be activity on all 4 test points.
- In the following positions the signals B0 + B3 are stable:

signal	STOP	PLAY	Service pos. 0,1,2	Service pos. 3
B0	"low"	"high"	"low"	"high"
B1	"high"	"high"	"high"	"high"
B2	"high"	"high"	"high"	"high"
B3	"low"	"low"	"low"	"low"

- **$\overline{\text{TL}}$ (pin 12; test point 16)**

- The $\overline{\text{TL}}$ signal (Track Lost) is used to tell the μP that track loss threatens. The μP then can give correction signals with B0 + B3.
- In the "SEARCH" mode, or when the player is bumped against, there are pulses on test point 16.

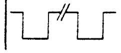
- **REdig (pin 13; test point 37)**

  The REdig signal (= Radial Error Digital = radial deviation) is used to determine the place of the arm relative to the track and to check/corect in case of track jumping or bumping against the player.

  In servicing position 3 or in the PLAY mode, a square wave should be present on test point 37.
  Because of frequency variations, this square wave is hard to trigger.

- **$\overline{\text{DODS}}$ (pin 4; test point 19)**

  The $\overline{\text{DODS}}$ signal (= Drop Out Detector Suppression) avoids that Drop-Out signals influence the arm control during track jumping.

Position of player	POWER ON	Servicing pos. 3	PLAY	SEARCH
$\overline{\text{DODS}}$ signal	"low"	"high"	"high"	

MDA 00364
T12 -638

II. CONTROL µP IC6566

- **Reset (pin 2; test point 100)**
  When the supply voltage is switched on a positive voltage should be present.
- **X-tal (pin 5; test point 101)**
  The frequency of this signal should be 4 MHz.
- **Data (pin 25; test point 102)**
- [illegible]
  There should be activity at test point 102 and 103 in position play (display information).
- **I^2C (pin 23, 17; test point 29)**
- **I^2D (pin 22; test point 31)**
  There should be activity at test point 29 and 31 in position play.
- **$\overline{\text{POR}}$ (pin 28; test point 104)**
  When the supply voltage is switched on a negative puls should be present.

III. PHOTODIODE SIGNAL PROCESSOR IC6525

- **SC (pin 25; test point 20)**
  SC (= Start Capacitor)

  High Ohmic measurement

Position of player	SC (pin 25)
POWER ON	-4 V
PLAY	+5 V
Servicing pos. 1	+5 V

- **$\overline{\text{Si}}$ (pin 20; test point 21)**
  LO (pin 17; test point 9, 9^A, 9^B)
- With the $\overline{\text{Si}}$ signal (= Start Initialization) the laser supply, among other things, is switched on.
  When the $\overline{\text{Si}}$ signal is "low", the LO signal (= Laser Out) should be "high".
  Via the LM signal (= Laser Monitor) the power supply for the laser diode is controlled.

Position of player	POWER ON	Servicing pos. 1*)	PLAY
$\overline{\text{Si}}$ signal	"high"	"low"	"low"
LO signal	"low"	"high"	"high"

*) To ensure that the player stays in servicing position 1, there should be a disc on the turntable.

- **LM (pin 16; test point 11) to check LM**
  See general checkpoints 'check of the laser supply'
- **To check the laser supply,** see General checkpoints "Check of the Laser Supply".
- **To check the focus offset,** see General checkpoints "Adjustment of the Focus Offet".

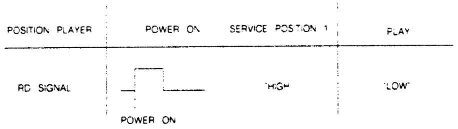
- **FE pin (pin 5; test point 26)**
- The FE signal (= Focus Error) is used to drive the focusing unit.
  When the $\overline{\text{Si}}$ signal goes "low", the focal point will be searched for.
- When the player is brought into servicing position 1 without disc, the objective will search 16x for the focal point.
  At test point 26 the FE signal varies 16x between +1.5 V and -1,3 V.
- The FE signal ensures that the spot stays in focus. When an error signal is injected, the FE signal will correct.
  Bring the player in servicing position 2 (with disc on turntable).

  Inject successively a voltage of +5 V and -6 V (= +5A and -6A) via a 200 kΩ resistance to test point 25.

Signal injected test point 25 IC7104A	+5 V	-6 V
FE signal	negative	positive

- **RD signal (pin 21; test point 24)**
  HIGH-OHMIC MEASUREMENT

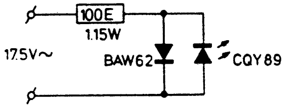
  The RD signal (= Ready) will go high when the starting procedure of IC6525 has been completed.



MDA 00363
T12 -636

- **D1 (pin 9 ; test point 4)**
  D2 (pin 10; test point 6)
  D3 (pin 8 ; test point 7)
  D4 (pin 7 ; test point 8)
- The signals D1÷D4 are the error signals from the photodetector circuits.
- When in servicing position 1 the disc is moved, the focusing unit should keep in track.
  When the disc is moving, there should be a changing signal on test points 4, 6, 7 and 8.

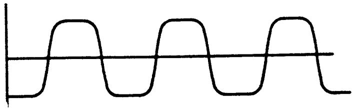
  Check of the photodetector.
  Connected the circuit below to an atternating voltage of 17,5 V.



39 368 A12

100 E-1.5 W	- 4822 116 51096
BAW 62	- 4822 130 30613
CQY 89	- 4822 130 31332

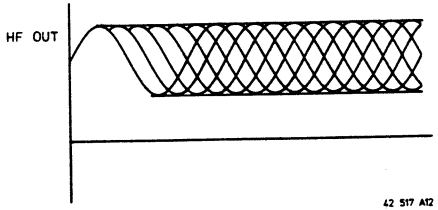
Switch on the supply voltage and bring the player in the stand-by mode or in serciving position 0.
In this measurement, infrared diode CQY89 replaces the function of the laser diode.
When this diode is held above the objective unit, the infrared light falls on the 4 photodiodes.
When the 4 photodiodes are functioning, the following voltage form will be visible on test point 4, 6, 7 and 8 on the panel.
(The amplitude depends on the distance between the IR diode and the objective).



38 314 A12

Position of the oscilloscope: 100 ms/div.

- **HF-in (pin 3, test point 3)**
- The HF-signal (= High Frequency in) is the information signal from the 4 photodiodes.
- **HF-out (pin 27; test point 17)**
- The HF-out signal (= High Frequency) is the amplified information signal for the decoder circuit.
  During playback of test disc no. 5 (4822 897 30096), a so-called "eye pattern" should be present on test point 17 (see figure below).
- The HF signal should be present and stable in:
- The PLAY mode and in
- Servicing position 3 after the lead-in track has been read.
- In servicing position 2 and during the reading of the lead-in track, the HF signal is present but is not stable.



42 517 A12

Position of the oscilloscope: 0,5 µs/div.
Amplitude about 1,5 V_{pp}

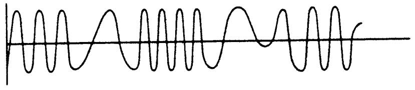
- **DET (pin 26)**
  $\overline{\text{HFD}}$ (pin 19; test point 23)
  $\overline{\text{TL}}$ (pin 18; test point 16)
- The DET signal (= Detector) gives information on the level of the HF signal to the high-frequency. Level-Drop-out detector IC6525.
- When the level of the HF signal is too low, the HFD signal (= High Frequency Detector) will go "low".
- The $\overline{\text{TL}}$ signal (= Track Lost) will then go "low" in order to tell the servo µP that the tracking signals RE1 and RE2 are unreliable.

Method:
(Can only be used in a playing set).

- Put test disc 5A (4822 397 30096) on the turntable.
- Switch on the power-supply switch and press the PLAY key.
- Play track number 10 or 15 and check the HFD signal at pin 19 (test point 23).
  When drop-out pulses are present on the DET signal (pin 26), the HFD pulses should also be present at pin 19 (test point 23).
  (Position of oscilloscope: 2 ms/div.).

When the disc is slowly braked by hand, $\overline{\text{TL}}$ pulses will be visible at pin 18 test point 16.

- **RE1 (pin 11; test point 18)**
  RE2 (pin 12; test point 22)
- Signals RE1 and RE2 (Radial Error) are the control signals for the arm during tracking.
- In servicing position 2, the following signals should be visible at test point 18 and 22.



30 743 812/A

Position of the oscilloscope: 2 ms/div.
The frequency strongly depends on the eccentricity of the disc.

IV. RADIAL ERROR PROCESSOR IC6529

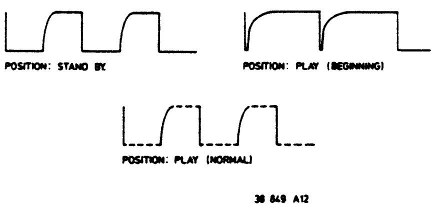
- **Check the signals between the µP and the Radial Error Processor**
- **DAC (pin 10; test point 38)**
  With the DAC signal (= Digital to Analogue Converter) the track jumping speed is controlled.
  This signal is derived from the signals B0 ÷ B3 coming from the µP.
- **RE-lag (pin 8; test point 41)**
  Capacitor 2559 in the RE-lag circuit has a memory function.
  It memorizes the degree of inclination of the disc.
  When a jump is made to a certain track on the disc, the memory should be cleared.
  This is done by the µP ($\overline{\text{RPU}}$ signal) via transistors 6533, 6534.

  During track jumping (SEARCH), slow pulses should be visible at test point 43 (position of the oscilloscope 0,1 ms/div.)
  In that case pulses should also be visible on the collector of transistor 6533, 6534.

V. DECODER-A IC

● Check the MC signal (pin 17; test point 12)

- In stand-by mode, the MC signal (Motor Control) corresponds to the figure below.
- Place a disc on the turntable.
- In position PLAY or SERVICE POSITION 3 the MC signal corresponds to the figure below.



Note:
During start-up the duty cycle is 98%, then the duty cycle of the signal becomes about 50%.

● VC (connector point 15-1; test point 46)

- Place a disc on the turntable.
- The voltage at connector point 15-1 during playback will be: $0 > V_c > -1.7$ V
  To check the turntable motor control, see C.D.M.-2 Service Manual: "Checking of the motor control".
  Check the HF-signal on pin 25 testpoint 65.
  - Place a disc on the turntable.
- The HF-signal is present and stable in the position play. See figur below.

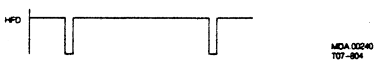
● Check the HFl-signal on pin 25; test point 65

- Place a disc on the turntable.
- The HF-signal is present and stable in the position play. See figure below.

● Check the HFD-signal on test point 66, pin 26

- Insert a disc.
- In the PLAY mode and in SERVICING POSITION 3 the HFD-signal is "high"; however, minor pulses may be present and in case of disorders on the disc.
- In SERVICING POSITION 2 and during playback of track no. 15 of test disc 5A HFD pulses are visible.

Position of the oscilloscope 5 ms/div.



● Check the CEFM signal (pin 27; test point 68)

- Place a disc on the turntable.
- In stand-by mode (only the mains switch is depressed), the frequency lies between 2.82 MHz and 5.64 MHz.
- In the position PLAY and SERVICE POSITION 2 and 3, the frequency is 4.32 MHz.

● Check the Xin signal (pin 19; test point 69)

- The Xin frequency is 11.2896 MHz.
- If this frequency deviates, check test point 70; Xout *signal. on Filter-B IC.*
  This frequency should also be 11.2896 MHz.

● Check the timing signals meant for Filter-B IC

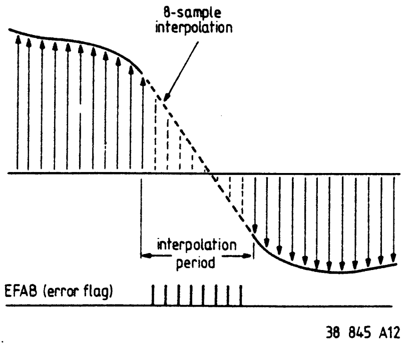
- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 2 or 3, or position PLAY.
- Trigger the oscilloscope with the WSAB signal (test point 71; pin 39).

- Check signals:
  WSAB at test point 71 (pin 39)
  (Word Select from Decoder-A to Filter-B)
  CLAB at test point 72 (pin 38)
  (Clock from Decoder-A to Filter-B)
  and their interrelation.
- There must be activity a test point 73 (pin 37), DAAB signal (DATA from Decoder-A to Filter-B).

● Check the EFAB signal (Error Flag from Decocder-A to Filter-B) at test point 74 (pin 36)

- Place test disc 5A on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 or position PLAY.
- During playback of track no. 17, a EFAB pulse should appear at test point 61 for a short moment.
  The EFAB pulses also appear when the disc is gently slowed down and during fast search (Fast Forward or Fast Reverse).

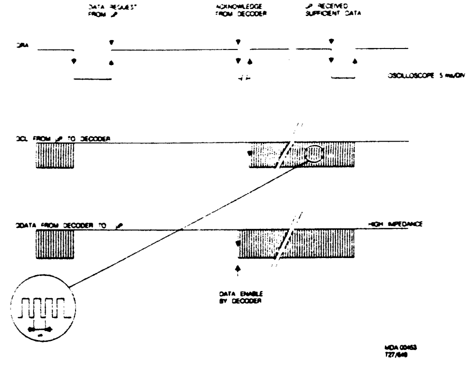
Note:
Filter-B IC is capable of interpolating linearly 8 successive EFAB pulses.



● Check the Q-channel signals

- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 or position PLAY.
- Trigger on the QRA signal (Q-channel Request Acknowledge) test point 75; pin30.
- Check signals: QRA at test point 75 (pin 30)
  QCL a test point 76 (pin 31)
  (Q-channel-clock)
  and their interrelation.
- There should then be activity at test point 77 (pin 29) QDA (Q-channel Data).

Note:
The QRA request is initiated by the µP (QRA "high"). Then Decoder-A answers this request (QRA goes "low"). With the next leading clock pulse (QCL) the QRA signal is rendered "high" again by the µP.
As soon as the µP has taken in enough information via QDA, QRA will go low again. That is why the QRA times vary each time.



● Check the $\overline{\text{SSM}}$ signal (test point 78; pin 33) = Start-Stop turntable motor

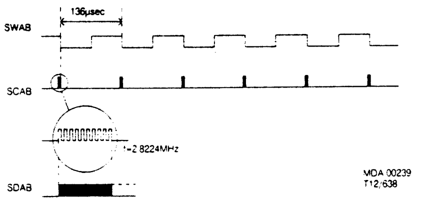
- Motor start pulse when test point 78 is "high" for ⩾ 0.2 sec.
- Motor stop pulse when test point 78 is "low" for ⩾ 0.2 sec.

Note:
After the motor start pulse, SWAB information (Subcoding Word clock) will become visible at this point. The period time of that signal is 136 µsec.

● Check the subcode clock signals

- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 or position PLAY.
- Trigger the oscilloscope with the SWAB signal at test point 78.
- Check the following signals:
  SWAB at test point 78; pin 33
  SCAB at test point 79; pin 35 (Subcode Clock from Decoder-A to Filter-B)
  SDAB at test point 80; pin 34 (Subcode Data from Decoder-A to Filter-B)
  and their interrelations.

Note:
While the burst of 10 clock pulses appear on SCAB the Q-channel information is transferred on SDAB.
Hereafter the P-bit indication follows.
The P-bit is "high" between two bursts of 10 clock pulses in case of pause indication and "low" in case of music indication.



● Check the $\overline{\text{CRI}}$ signal (pin 28)

The $\overline{\text{CRI}}$ signal is "low" in case of track jumping. Player in position SEARCH.

● Check the DEEM signal (test point 84; pin 32)

- Place test disc 5 on the turntable.
- During playback of track no. 14 (recorded without PRE-EMPHASIS), the DEEM signal should be "low".
- During playback of track no. 15 (recorded without PRE-EMPHASIS), the DEEM signal should be "high".

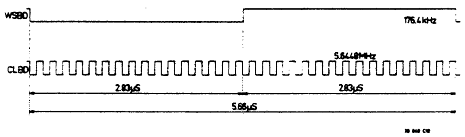
VI. FILTER-B IC

● Check the signals between Decoder-A IC and Filter-B IC

- See sub. "V. Decoder-A IC":
  - Check the X-tal signal
  - Check the timing signals meant for Filter B (WSAB, CLAB, DAAB signals; test points 71, 72 and 73).
  - Check the EFAB signal (test point 74)
  - Check the subcode clock signals (SWAB, SCAB, SDAB signals; test points 78, 79 and 80).

● Check the timing signals between Filter-B IC and DAC IC

- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 or position PLAY.
- Trigger the oscilloscope with the WSBD signal (Word Select from Filter B to DAC) test point 85 (pin 18).
- Check the following signals:
  WSBD at test point 85; pin 18
  CLBD at test point 87; pin 16(Clock signal from Filter B to DAC)
  and their interrelation.
  If an Audio Disc is used, there should be activity at test point 86 (pin 15) DABD signal (DATA from Filter B to DAC).
  If a disc with Digital Data (CD-ROM) is used, this point is continuously switched "low" by transistor 6562.

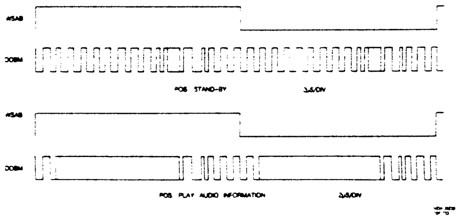


● Check the DOBM signal (Digital Output)

- Place a disc on the turntable.
- Select the stand-by mode (only mains switch depresed).
- Trigger the oscilloscope with the WSAB signal (test point 71).

● Check the DOBM signal (test point 88; pin 14)

- An empthy audio signal has a fixed pattern. See drawing "Stand-by".
- Select the PLAY mode.
  Check the DOBM signal. See drawing "PLAY".



- **In position SEARCH the $\overline{\text{ATSB}}$ signal is "low" (test point 89; pin 22) (Attenuation Audio Signal)**

- **Check the $\overline{\text{MUSB}}$ signal (test point 90; pin 23 Soft Mute)**

  This signal is "low" in positions:
  PAUSE
  NEXT or PREVIOUS when jumping from one track to another.
  Fast SEARCH when the search button is kept depressed for some time.

VII. DAC IC (Dual Digital Analog Converter)

- **Check the signals between Filter-B IC and DAC IC**

- See sub. "VI. Filter-B IC":
  * Check the timing signals between Filter-B IC and DAC IC

- **Check the output of the OP-AMP after the DAC IC**

- Place a disc on the turntable.
- In position PLAY or in SERVICE POSITION 3, the analog (music) signal should be present at the output of the OP-AMP, after the lead-in track has been read.

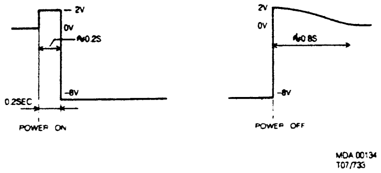
VIII. DEEM CIRCUIT

- **Check DEEM circuit**

- Place test disc 5 on the turntable.
- During playback of track no. 14 (recorded without PRE-EMPHASIS) the DEEM signal at test point 84 should be "low".
- During playback of track no. 15 (recorded with PRE-EMPHASIS) the DEEM signal at test point 84 should be "high".
- During playback of track no. 14 the analogue signal should be present at the source of 6583 (test point 91) and 6582 (test point 92).
- During playback of track no. 15 the analog signal at the source of 6583 (test point 91) and 6582 (test point 92) should be 0 V.

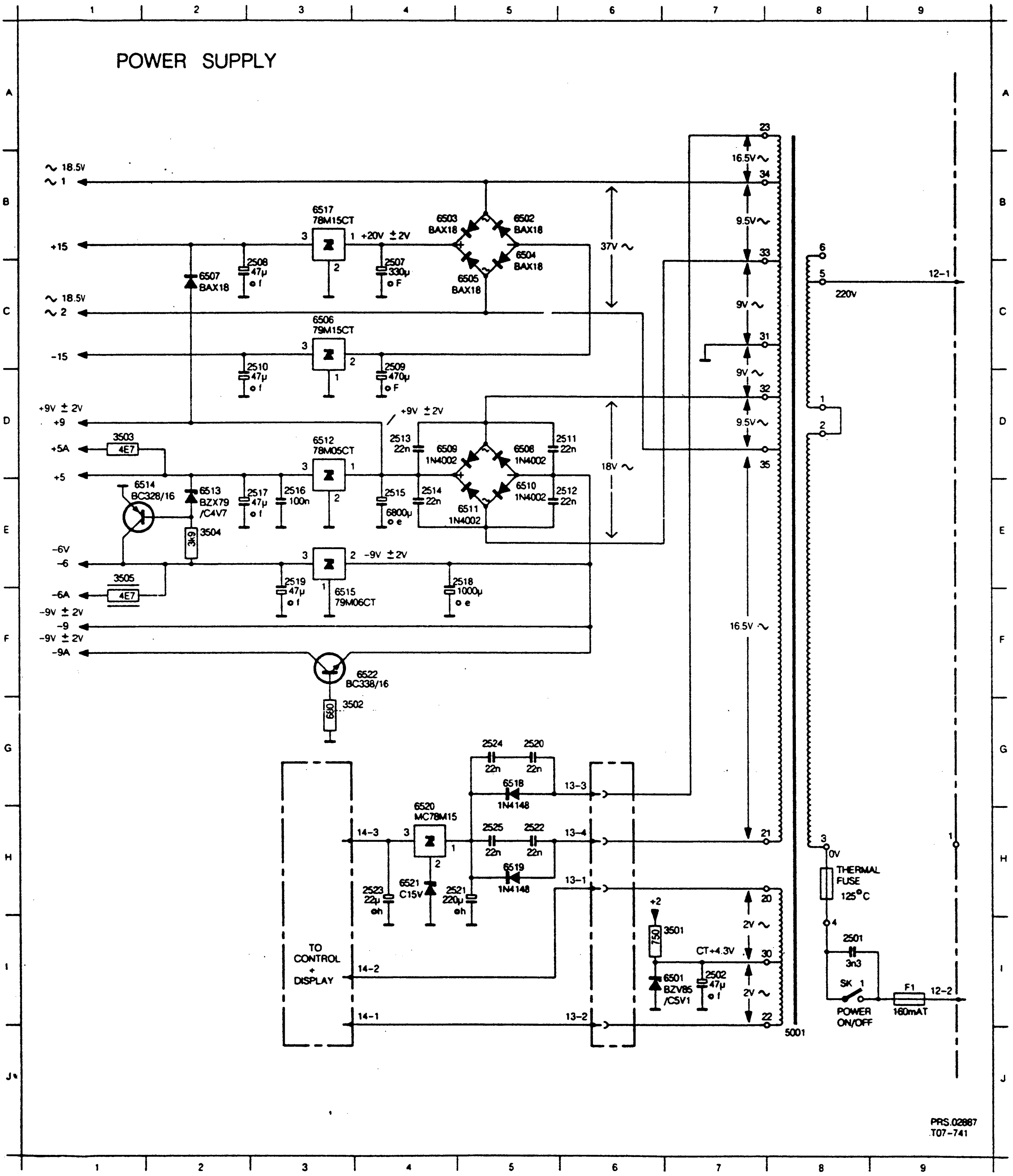
IX. KILL CIRCUIT

- During switching on and off the mains voltage the signal on the collector of 6580 (to be measured on a jumper, tp93) should be as indicated in the figure below.



2501	I 8	2509	C 4	2513	D 4	2517	E 3	2521	H 5	2525	H 5	3504	E 2	6502	B 5	6506	C 3	6510	E 5	6514	E 2	6519	H 5	F1	I 9
2502	I 7	2510	C 3	2514	E 4	2518	E 5	2522	H 5	3501	I 7	3505	E 1	6503	B 4	6507	C 2	6511	E 5	6515	F 3	6520	G 4	SK 1	I 8
2507	C 4	2511	D 6	2515	E 4	2519	E 3	2523	H 4	3502	G 4	5001	J 8	6504	B 5	6508	D 5	6512	D 3	6517	B 3	6521	H 4		
2508	C 3	2512	E 6	2516	E 3	2520	G 5	2524	G 5	3503	D 1	6501	I 7	6505	C 5	6509	D 4	6513	E 2	6518	G 5	6522	F 4		

POWER SUPPLY

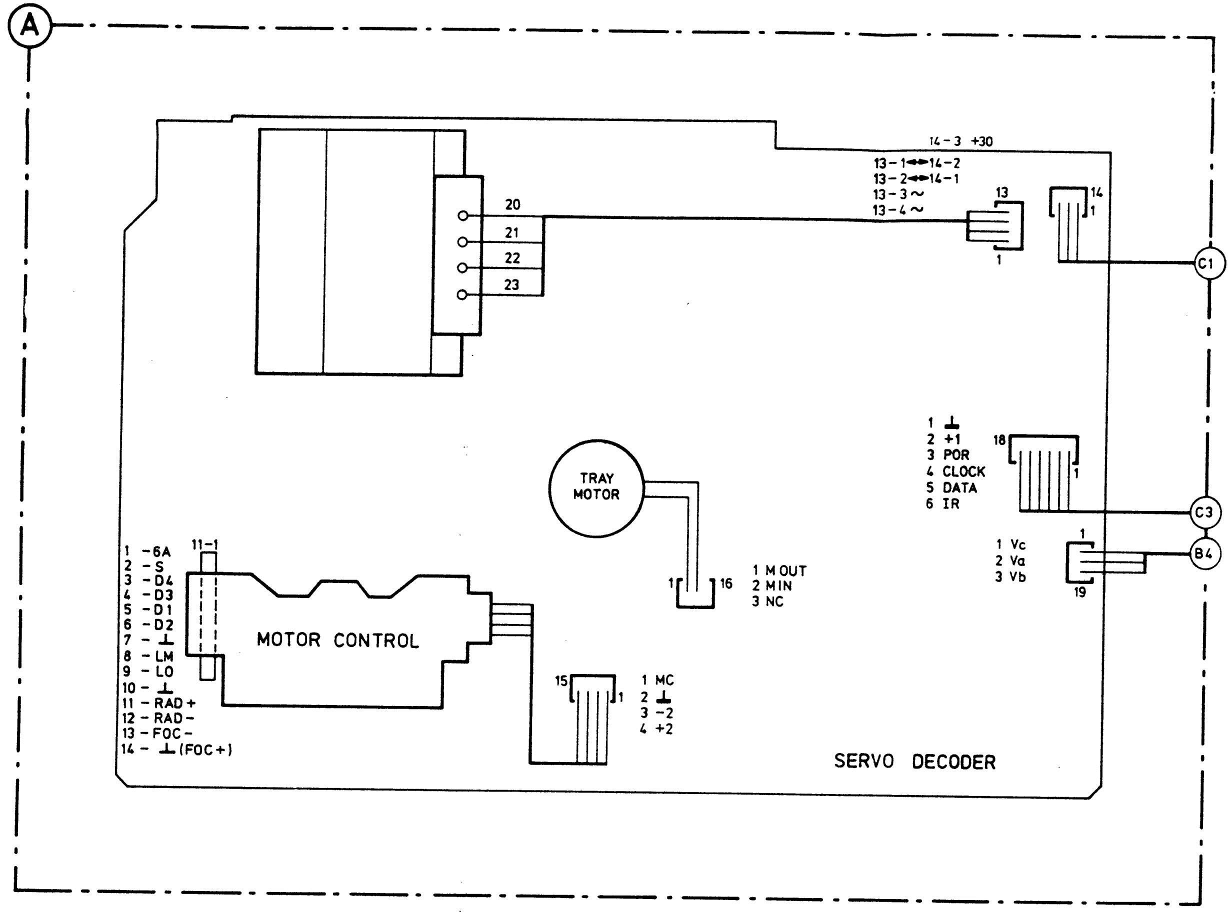


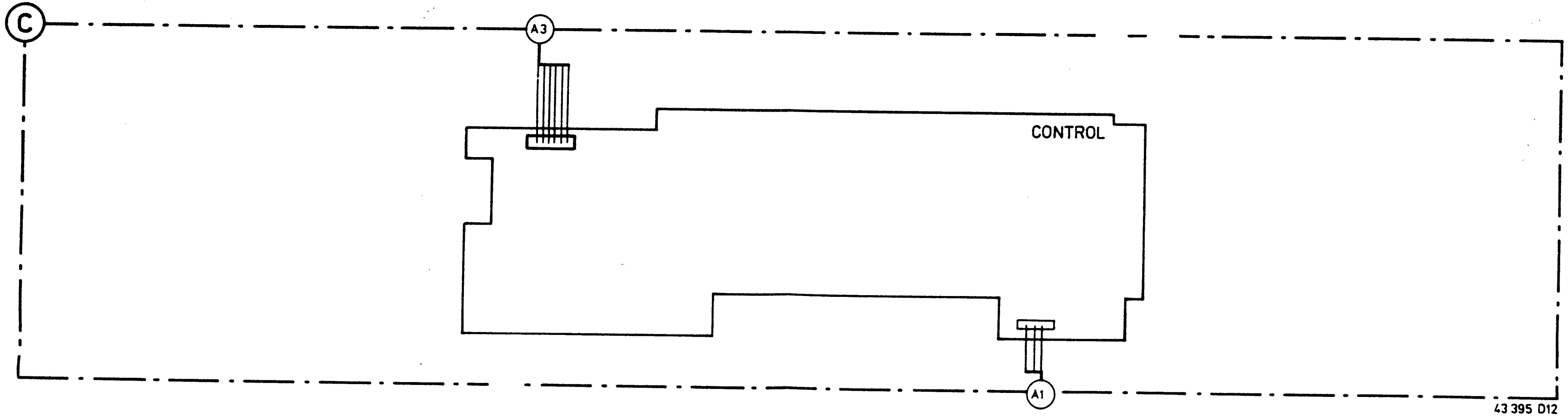
1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
G
H
I
J
~ 18.5V
~ 1
+15
~ 18.5V
~ 2
-15
+9V ± 2V
+9
+5A
+5
-6V
-6
-6A
-9V ± 2V
-9
-9V ± 2V
-9A
6517
78M15CT
+20V ± 2V
6503
BAX18
6502
BAX18
6504
BAX18
6505
BAX18
2508
47µ
2507
330µ
6507
BAX18
37V ~
6506
79M15CT
2510
47µ
2509
470µ
+9V ± 2V
3503
4E7
6512
78M05CT
2513
22n
6509
1N4002
6508
1N4002
2511
22n
18V ~
6514
BC328/16
6513
BZX79
/C4V7
2517
47µ
2516
100n
2515
6800µ
2514
22n
6511
1N4002
6510
1N4002
2512
22n
3K9
3504
-9V ± 2V
2519
47µ
6515
79M06CT
2518
1000µ
3505
4E7
6522
BC338/16
680
3502
23
16.5V ~
34
9.5V ~
33
9V ~
31
9V ~
32
9.5V ~
35
16.5V ~
21
20
2V ~
CT+4.3V
30
2V ~
22
5001
6
5
220V
12-1
1
2
3
0V
THERMAL
FUSE
125°C
4
2501
3n3
SK 1
POWER
ON/OFF
F1
160mAT
12-2
2524
22n
2520
22n
6518
1N4148
13-3
6520
MC78M15
14-3
2525
22n
2522
22n
13-4
6519
1N4148
13-1
6521
C15V
2523
22µ
2521
220µ
TO
CONTROL
+
DISPLAY
14-2
14-1
13-2
+2
750
3501
6501
BZV85
/C5V1
2502
47µ
PRS.02867
T07-741

ELECTRICAL PARTSLIST

Loc. no.	Part no.	Reference no.	Description
SK 1	22108179	4822 276 11309	Switch. Pushbut.
BU 1	22169404	4822 265 20291	Connector
SK 2	22108178	4822 276 11896	Switch tray detection
217	25779778	4822 492 63076	Spring. Clamping
BU 2	22198405	4822 267 40765	Cinch Socket 3P
1502	22153580	4822 242 71508	Ceram Filter
1503	22291607	4822 157 50963	Coil
1504	22153581	4822 242 72082	Crystal
1505	22153582	4822 242 71644	Crystal
1506	22216329	4822 148 80281	Transformer
1507	22291608	4822 157 51193	Coil
1508	22291608	4822 157 51193	Coil
1509	22144027	4822 253 10054	Fusc. TR5-T. 19372. 160MA
2501	20300024	4822 122 40327	Cap. Ceramic. 3.3 nF, 400 V
3517	22659080	4822 100 20522	Potm. Carb. Track. 22k
3528	22659081	4822 101 10685	Potm. Trimmer. 4k7
6501	22119490	4822 130 31456	Diode. Reference. BZV85-C5V1
6502	22119491	4822 130 34121	Diode. BAX18
6503	22119491	4822 130 34121	Diode. BAX18
6504	22119491	4822 130 34121	Diode. BAX18
6505	22119491	4822 130 34121	Diode. BAX18
6506	22128615	5322 209 86361	Integr. Circuit. MC79M15CT
6507	22119491	4822 130 34121	Diode. BAX18
6508	22119492	5322 130 30684	Diode. 1N4002
6509	22119492	5322 130 30684	Diode. 1N4002
6510	22119492	5322 130 30684	Diode. 1N4002
6511	22119492	5322 130 30684	Diode. 1N4002
6512	22128616	4822 209 71579	Integr. Circuit. TY40408
6513	22119493	4822 130 32986	Diode. Reference. HZ5B1
6514	22128617	4822 130 41023	Transistor. BC328-16
6515	22128618	4822 209 82056	Integr. Circuit. MC7906CT
6517	22128619	4822 209 80808	Integr. Circuit. MC78M15CT
6518	22119492	5322 130 30684	Diode. 1N4002
6519	22119492	5322 130 30684	Diode. 1N4002
6520	22128619	4822 209 80808	Integr. Circuit. MC78M15CT
6521	22119488	4822 130 80138	Diode. HZ15-3
6522	22128620	4822 130 44121	Transistor. BC338
6525	22128621	4822 209 83202	Integr. Circuit. TDA5708
6526	22128622	4822 209 72587	Integr. Circuit. TCA0372DP2
6527	22128620	4822 130 44121	Transistor. BC338
6529	22128623	4822 209 83203	Integr. Circuit. TDA5709/C3
6530	22119489	4822 130 30621	Diode. 1N4148
6531	22119494	4822 130 32862	Diode. Reference. HZ7C2
6532	22119494	4822 130 32862	Diode. Reference. HZ7C2
6533	22128614	4822 130 40937	Transistor. BC548B
6534	22128624	5322 130 41983	Transistor. BC858B
6536	22119495	4822 130 31983	Diode. BAT85
6537	22119489	4822 130 30621	Diode. 1N4148
6539	22128625	4822 209 83274	Integr. Circuit. NJM4560D
6549	22128620	4822 130 44121	Transistor. BC338
6550	22128614	4822 130 40937	Transistor. BC548B
6551	22128626	4822 209 11544	Integr. Circuit. MAB8441P/T120
6552	22119489	4822 130 30621	Diode. 1N4148
6553	22128627	4822 130 44237	Transistor. BF450
6554	22128628	4822 209 71001	Integr. Circuit. SAA7210P/04
6555	22128629	5322 209 82903	Integr. Circuit. UPD41416C-20
6556	22128630	4822 130 44104	Transistor. BC328
6557	22128630	4822 130 44104	Transistor. BC328
6558	22119496	4822 130 33293	Diode. Reference. HZ5C2
6559	22119496	4822 130 33293	Diode. Reference. HZ5C2
6560	22128631	4822 130 60491	Transistor. BC375
6561	22128631	4822 130 60491	Transistor. BC375
6562	22128620	4822 130 44121	Transistor. BC338
6563	22128632	4822 209 11157	Integr. Circuit. SAA7220P/A
6564	22128633	4822 130 44197	Transistor. BC558B
6565	22128614	4822 130 40937	Transistor. BC548B
6566	22128634	4822 209 72291	Integr. Circuit. MC6805L8/ZC86606
6568	22128614	4822 130 40937	Transistor. BC548B
6571	22128635	4822 209 70295	Integr. Circuit. TDA1541
6572	22128633	4822 130 44197	Transistor. BC558B
6573	22119492	5322 130 30684	Diode. 1N4002
6574	22119492	5322 130 30684	Diode, 1N4002
6575,6576	22119489	4822 130 30621	Diode, 1N4148
6577	22128636	4822 130 40823	Transistor, BD135
6578	22119497	4822 130 32843	Diode, HZ4B2, reference
6579	22119489	4822 130 30621	Diode, 1N4148
6580	22128633	4822 130 44197	Transistor, BC558B
6581	22128614	4822 130 40937	Transistor, BC548B
6582,6583	22128637	4822 130 42633	Transistor, BSR56
6584,6585	22128638	4822 209 83163	IC, LM833N
6586	22128620	4822 130 44121	Transistor, BC338
6587	22128620	4822 130 44121	Transistor, BC338
6588	22128620	4822 130 44121	Transistor, BC338
6589	22128620	4822 130 44121	Transistor, BC338
6595	22128625	4822 209 83274	Integr. Circuit, NJM4560D
5001	22225122	4822 146 30615	Transf. Mains
			Capacitors
2534	20400014	4822 122 10177	10N 25V
2568	20400015	4822 121 43048	330N 63V
2650	20400016	4822 124 21984	100M 25V
2651,2655	20400017	4822 124 22339	100M 16V
			Safety Resistors
3604,3515 3523	20540222	4822 111 30483	1E
3581,3602 3701,3702	20540223	4822 111 30492	2E2
3703	20540224	4822 111 30593	3E3
3591,3613 3505,3503 3544	20540225	4822 111 30499	4E7
3620,3621	20540226	4822 111 30508	10E
3533	20540227	4822 111 30511	12E
3532	20540228	4822 111 30515	18E
3638,3639 3646,3647	20540229	4822 111 30522	33E
			Miscellaneous
	22947287	3104 216 21210	Polyethylene Foam Foil
	22930642	3104 106 43310	Package box (XR-9118)
	22930643	3104 106 43390	Package box (XR-9128)
	22938074	4822 600 70551	Styroform Buffers
	22199432	4822 214 51719	PC Board Assy

WIRING DIAGRAM

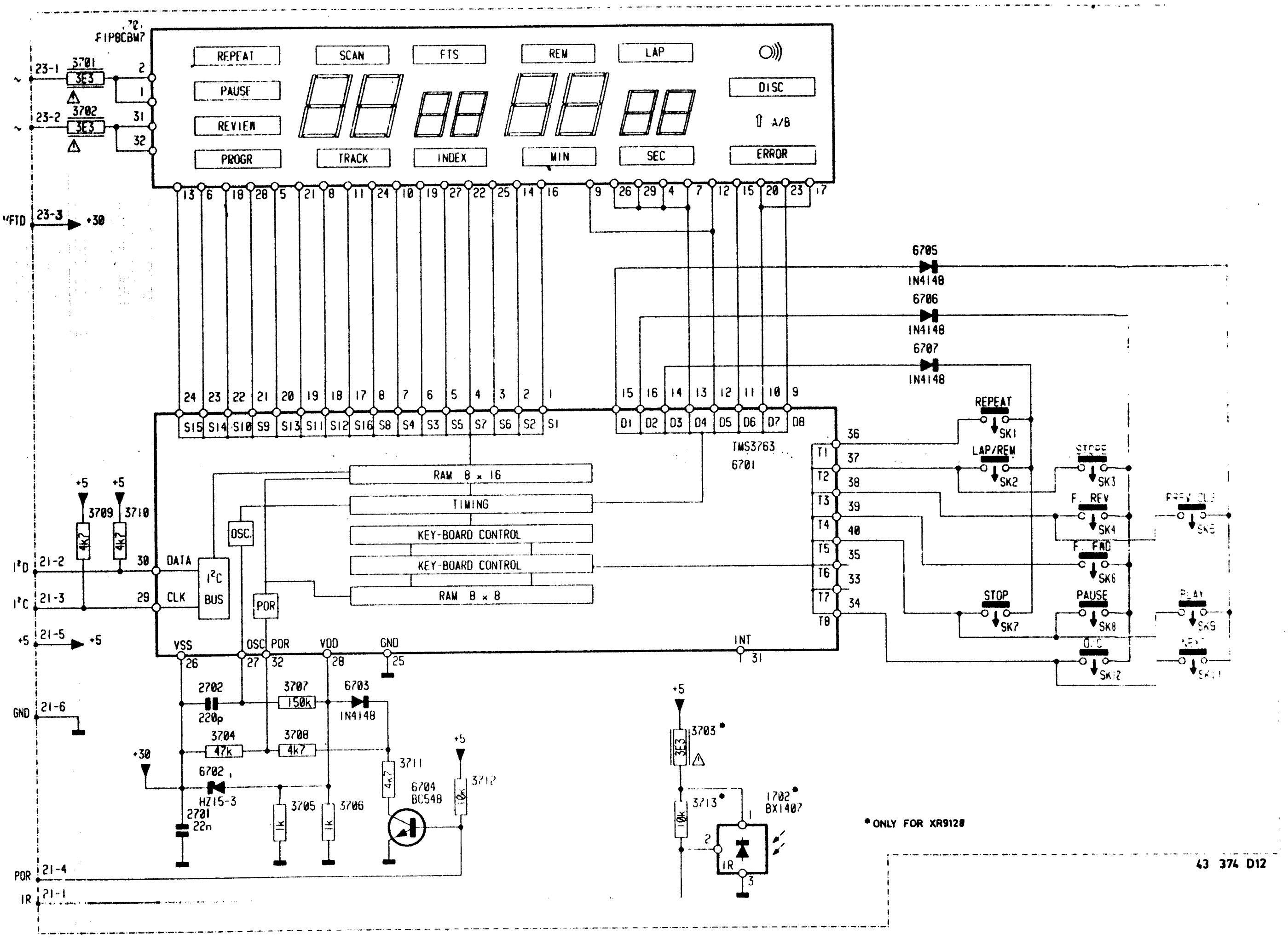

A
14 - 3 +30
13 - 1 ⟷ 14 - 2
13 - 2 ⟷ 14 - 1
13 - 3 ~
13 - 4 ~
13
1
14
1
20
21
22
23
C1
1 ⊥
2 +1
3 POR
4 CLOCK
5 DATA
6 IR
18
1
C3
1 Vc
2 Va
3 Vb
1
19
B4
TRAY MOTOR
1
16
1 M OUT
2 M IN
3 NC
1 -6A
2 -S
3 -D4
4 -D3
5 -D1
6 -D2
7 - ⊥
8 - LM
9 - LO
10 - ⊥
11 - RAD +
12 - RAD -
13 - FOC -
14 - ⊥ (FOC +)
11-1
MOTOR CONTROL
15
1
1 MC
2 ⊥
3 -2
4 +2
SERVO DECODER


C
A3
CONTROL
A1

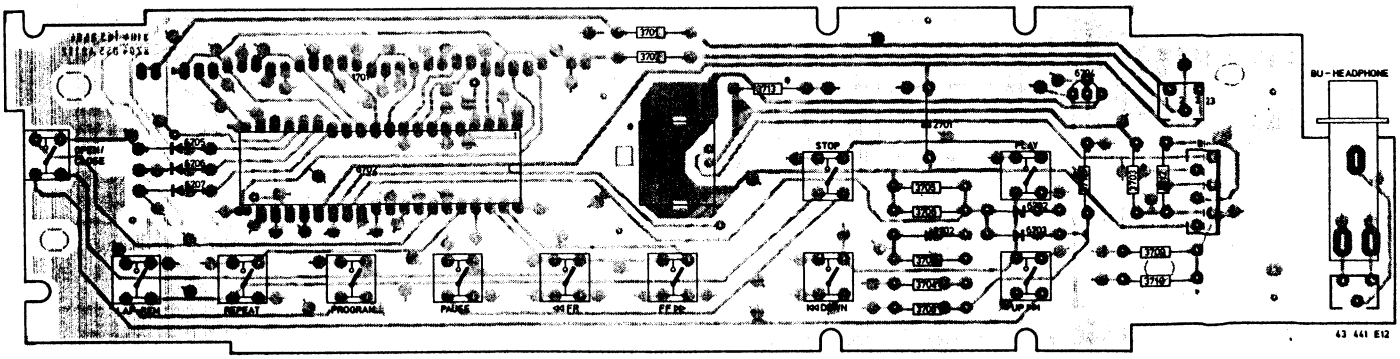
CS 16 428

43 395 D12

CONTROL DISPLAY CIRCUIT


FIP8CBM7
3701
3E3
3702
3E3
23-1
23-2
23-3
+30
VFTD
REPEAT
PAUSE
REVIEW
PROGR
SCAN
FTS
REM
LAP
DISC
A/B
TRACK
INDEX
MIN
SEC
ERROR
6705
1N4148
6706
1N4148
6707
1N4148
TMS3763
6701
S15 S14 S10 S9 S13 S11 S12 S16 S8 S4 S3 S5 S7 S6 S2 S1
D1 D2 D3 D4 D5 D6 D7 D8
T1 T2 T3 T4 T5 T6 T7 T8
RAM 8 × 16
TIMING
KEY-BOARD CONTROL
KEY-BOARD CONTROL
RAM 8 × 8
OSC.
I²C BUS
POR
DATA
CLK
VSS
OSC
POR
VDD
GND
INT
+5
3709
3710
4k7
4k7
I²D
I²C
21-2
21-3
21-5
21-6
21-4
21-1
+5
GND
POR
IR
2702
220p
3707
150k
6703
1N4148
3704
47k
3708
4k7
+30
6702
HZ15-3
2701
22n
3705
3706
1k
1k
3711
4k7
6704
BC548
3712
10k
+5
3703*
3E3
3713*
10k
1702*
BX1407
IR
REPEAT
SK1
LAP/REM
SK2
STORE
SK3
F. REV
SK4
PREV.CLS
SK5
F. FWD
SK6
STOP
SK7
PAUSE
SK8
PLAY
SK9
OPEN
SK10
NEXT
SK11
*ONLY FOR XR9120
43 374 D12

CONTROL AND DISPLAY PANEL

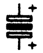
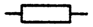
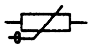
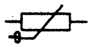
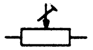
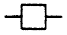
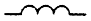
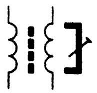
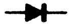
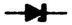
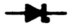
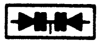
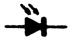
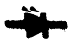

3701
3702
6705
6706
6707
6701
6702
3713
2701
STOP
PLAY
3705
3706
3707
3708
3704
3703
3709
3710
REPEAT
PROGRAM
PAUSE
◄◄FR
FF►►
NEXT
BU-HEADPHONE
43 441 E12

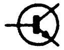
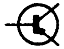
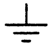
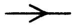
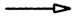
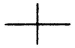
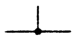
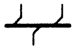
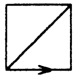
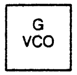
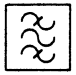
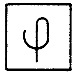
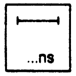
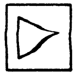
* ONLY FOR XR9120

PARTSLIST CONTROL AND DISPLAY

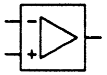
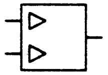
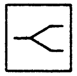
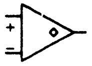
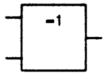
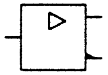
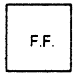
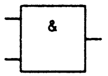
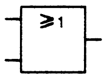
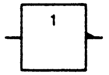
Loc. no.	Part no.	Reference no.	Description
SK 1	22108178	4822 276 11896	Switch repeat
SK 2	22108178	4822 276 11896	Switch LAP/REM
SK 3	22108178	4822 276 11896	Switch Store
SK 4	22108178	4822 276 11896	Switch F. rev
SK 5	22108178	4822 276 11896	Switch Previous
SK 6	22108178	4822 276 11896	Switch F. FWD
SK 7	22108178	4822 276 11896	Switch Stop
SK 8	22108178	4822 276 11896	Switch Pause
SK 9	22108178	4822 276 11896	Switch play
SK10	22108178	4822 276 11896	Switch O/C
SK11	22108178	4822 276 11896	Switch Next
BU 3	22198404	4822 267 30743	Headphone socket
1701	22104732	4822 130 90492	Display. FIP8CBM7
1702	22128612	4822 218 10212	Receiver. BX-1407 (XR-9128)
6701	22128613	4822 209 82385	Integr.cuiruit. TMS3763CNL
6702	22119488	4822 130 80138	Diode HZ15-3
6703	22119489	4822 130 30621	Diode 1N4148
6704	22128614	4822 130 40937	Transistor. BC548B
6705	22119489	4822 130 30621	Diode 1N4148
6706	22119489	4822 130 30621	Diode 1N4148
6707	22119489	4822 130 39621	Diode 1N4148
			Miscellaneous
	22120204	4822 701 10701	Transmitter (XR-9128)
	22908675	4822 701 10699	Owner's manual

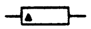
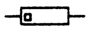
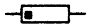
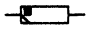
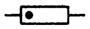
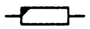
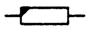
LIST OF SYMBOLS

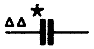
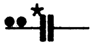
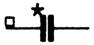
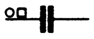
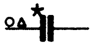
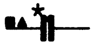
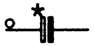
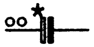
SYMBOL	DESCRIPTION
	Capacitor, general
	Electrolytic capacitor (+ and – may be omitted)
	Bipolar electrolytic capacitor (+ may be omitted)
	Resistor, general
	N.T.C. resistor
	P.T.C. resistor
	Voltage divider with preset adjustment
	Chip jumper
	Pin contact
	Bus contact
	Coil, self-induction
	Transformer with electrically poor conducting core and adjustable pre-magnetization
	Diode
	Zener diode
	Stabistor
	Double variable capacity diode (in one envelope)
	Photo conductive diode
	L.E.D.

SYMBOL	DESCRIPTION
	Transistor (N.P.N.)
	Transistor (P.N.P.)
	Direct current (DC)
	Alternating current (AC)
	Earth (functional)
	Frame or chassis connection
	Direction in which AC voltages are passed on (optional present)
	Interrupted line
	Not-connected crossing lines
	Connected lines
	Cable tree with lead-outs
	Changer, general (arrow is optional)
	Voltage Controlled Oscillator
	Band-pass filter
	Phase changing network
	Delay element
	Amplifier, general

MDA 00083
T32-735

SYMBOL	DESCRIPTION
	Operational amplifier
	Differential amplifier
	Splitter
	Operational amplifier with open output
	Exclusive OR gate
	True/complement amplifier with high input
	Flip Flop
	AND gate
	OR gate
	Inverter with high input

	0.2W (CR 16)	≤ 220kΩ > 270kΩ	5% 10%
	0.33W (CR 25)	≤ 1MΩ > 1MΩ	5% 10%
	0.33W (SFR25)		5%
	0.25W (VR 25)	≤ 10MΩ > 10MΩ	5% 10%
	0.5W (CR 37)	≤ 1MΩ > 1MΩ	5% 10%
	0.67W (CR 52)		5%
	1.15W (CR 68)		5%

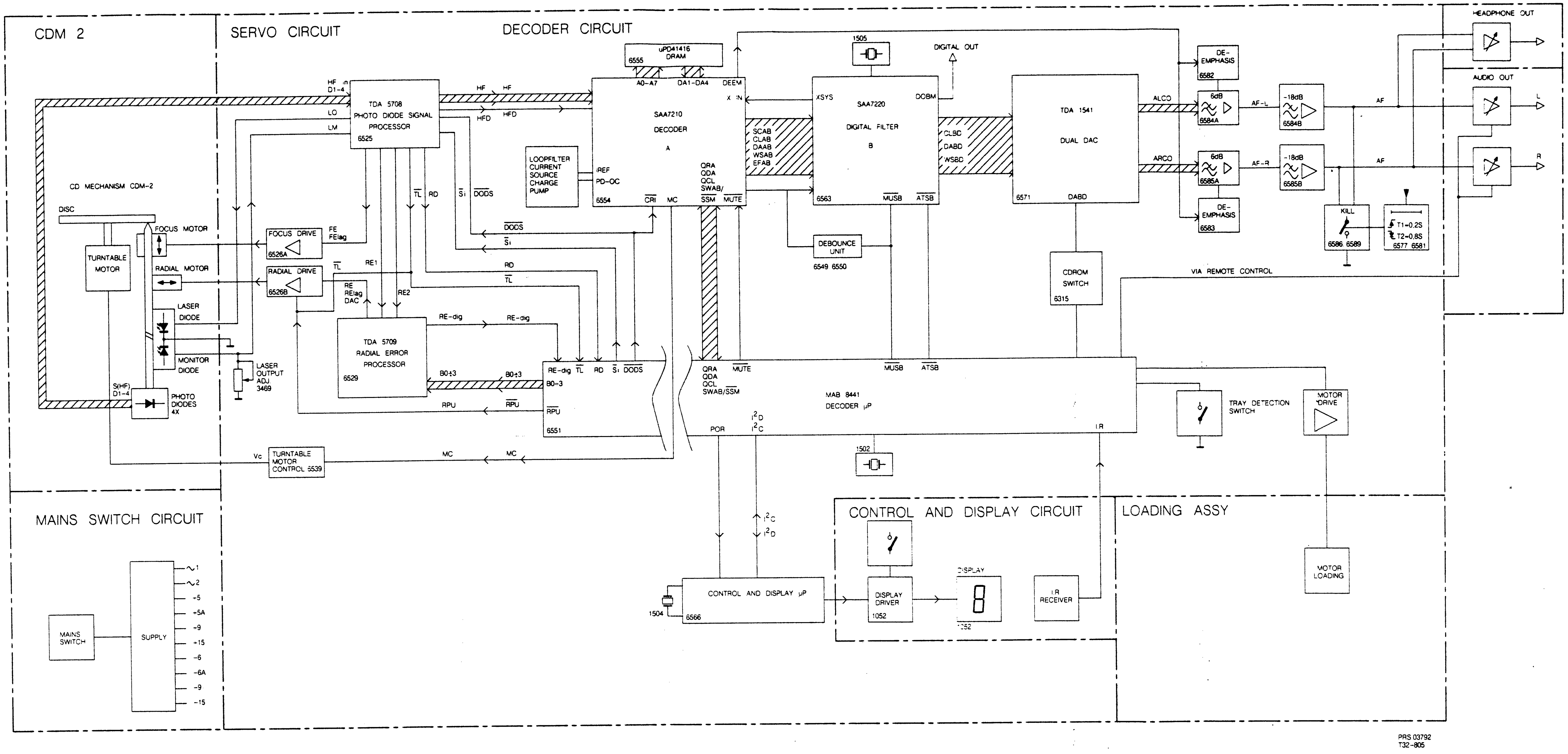
	Ceramic plate
	Polyester flat foil
	Polyester mepolesco
	Mylar (Polyester flat foil small sized)
	Micropoco
	Tubular ceramic (body colour pink or yellow/green)
	Miniature single elco
	Subminiature tantalum

*
a-2,5V
b-4V
c-6,3V
d-10V
e-16V
f-25V
g-40V
h-63V
i-100V
j-125V
l-125V
m-150V
n-160V
q-200V
r-250V
s-300V
t-350V
u-400V
v-500V
w-630V
x-1000V
A-1.6V
B-6V
C-12V
D-15V
E-20V
F-35V
G-50V
H-75V
I-80V

MDA.00084
T32-735

PARTSLIST OF CHIPCOMPONENTS

Part no.	Reference no.	Description
20360043	4822 122 31772	47p
20360044	4822 122 31765	100p
20360045	4822 122 31965	220p
20360041	4822 122 31727	470p
20360047	4822 122 31775	680p
20360048	4822 122 32153	1.8n
20360049	4822 122 31783	2.7n
20360050	4822 122 31784	4.7n
20360051	4822 122 31916	5.6n
20360052	4822 122 32442	10n
20360056	4822 122 31759	18n
20360053	4822 122 31797	22n
20360054	4822 122 33147	22n
20360055	4822 122 32183	56n
20360057	4822 122 33156	100n 63V
20540183	4822 111 90163	OE jumper
20540184	4822 111 90344	15E
20540185	4822 111 90186	22E
20540186	5322 111 90105	27E
20540187	4822 111 90361	39E
20540188	5322 111 90091	100E
20540189	5322 111 90098	150E
20540190	4822 111 90178	220E
20540191	5322 111 90138	390E
20540192	5322 111 90113	560E
20540193	4822 111 90366	620E
20540194	4822 111 90162	680E
20540195	5322 111 90306	750E
20540196	5322 111 90092	1K
20540197	4822 116 90418	1.2K
20540198	5322 111 90101	1.8K
20540199	4822 111 90248	2.2K
20540200	4822 111 90289	2.4K
20540201	4822 111 90571	3.9K
20540202	5322 111 90111	4.7K
20540203	4822 111 90544	6.8K
20540204	4822 116 90219	8.2K
20540205	4822 111 91249	10K
20540206	4822 111 90494	11K
20540207	4822 111 90253	12K
20540208	4822 111 90346	16K
20540209	4822 111 90238	18K
20540210	4822 111 90251	22K
20540211	5322 111 90108	39K
20540212	4822 111 90543	47K
20540213	5322 111 90274	51K
20540214	4822 111 90202	68K
20540215	4822 111 90575	82K
20540216	4822 111 90214	100K
20540217	4822 116 90417	150K
20540218	4822 111 91495	160K
20540219	4822 111 90368	680K
20540220	4822 111 90252	1M
20540221	4822 111 90425	5.6M


CDM 2
SERVO CIRCUIT
DECODER CIRCUIT
HEADPHONE OUT
AUDIO OUT
CD MECHANISM CDM-2
DISC
FOCUS MOTOR
TURNTABLE MOTOR
RADIAL MOTOR
LASER DIODE
MONITOR DIODE
PHOTO DIODES 4X
LASER OUTPUT ADJ. 3469
TDA 5708 PHOTO DIODE SIGNAL PROCESSOR 6525
FOCUS DRIVE 6526A
RADIAL DRIVE 6526B
TDA 5709 RADIAL ERROR PROCESSOR 6529
uPD41416 DRAM 6555
SAA7210 DECODER A 6554
LOOPFILTER CURRENT SOURCE CHARGE PUMP
SAA7220 DIGITAL FILTER B 6563
TDA 1541 DUAL DAC 6571
DIGITAL OUT
1505
DE-EMPHASIS 6582
DE-EMPHASIS 6583
6dB 6584A
6dB 6585A
-18dB 6584B
-18dB 6585B
KILL 6586 6589
T1=0.2S T2=0.8S 6577 6581
DEBOUNCE UNIT 6549 6550
CDROM SWITCH 6315
VIA REMOTE CONTROL
MAB 8441 DECODER µP
TRAY DETECTION SWITCH
MOTOR DRIVE
1502
TURNTABLE MOTOR CONTROL 6539
CONTROL AND DISPLAY CIRCUIT
LOADING ASSY
MAINS SWITCH CIRCUIT
MAINS SWITCH
SUPPLY
CONTROL AND DISPLAY µP 6566
1504
DISPLAY DRIVER 1052
DISPLAY
IR RECEIVER
MOTOR LOADING
HF-in D1-4
LO
LM
HF
HFD
FE FElag
RE RElag DAC
RE1
RE2
TL
RD
Si
DODS
RE-dig
B0±3
RPU
MC
Vc
S(HF) D1-4
A0-A7
DA1-DA4
DEEM
XIN
IREF
PD-OC
QRA QDA QCL SWAB/SSM
CRI
MUTE
SCAB CLAB DAAB WSAB EFAB
XSYS
DOBM
MUSB
ATSB
CLBD DABD WSBD
DABD
ALCO
ARCO
AF-L
AF-R
AF
L
R
POR
I²D I²C
IR
PRS 03792 T32-805

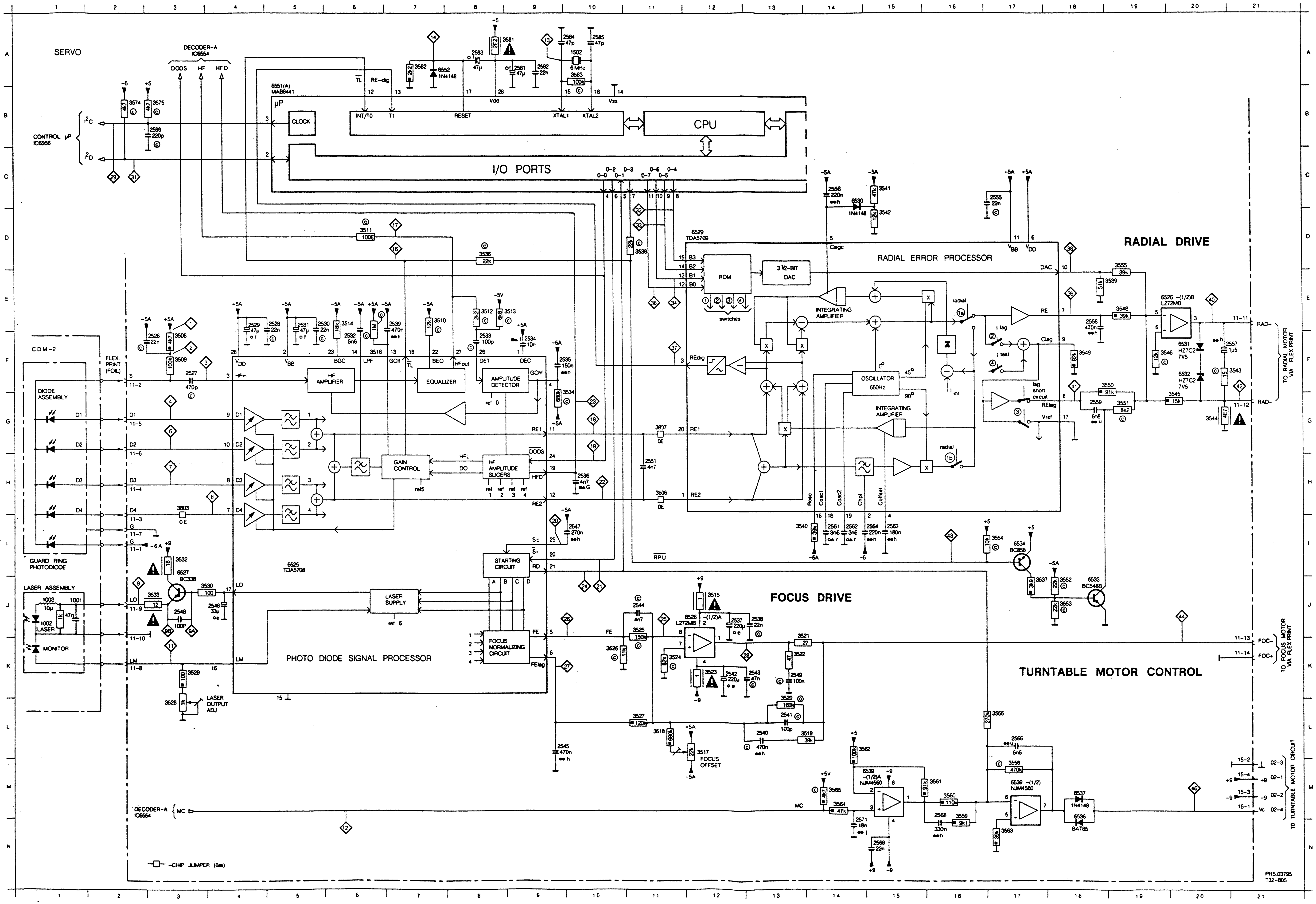
B0-B3 - Control bits for radial circuit
DAC - Current output for track jumping (Digital to Analogue Converted)
$\overline{\text{DODS}}$ - Drop out detector supression
D1÷4 - Photodiode currents
FE - Focus error signal
FE-lag - Focus error signal for LAG network
HF - HF output for DEMOD
HFD - HF detector output for DEMOD
HF-in - HF current input
LM - Laser monitor diode input
LO - laser amplifier current output
MC - Motor control signal
RE - Radial error signal (amplified RE_2-RE_1 currents)
RE1 - Radial error signal 1 (summation of amplified currents D_3 and D_4

RE2 - Radial error signal 2 (summation of amplified currents D_1 and D_2
RE dig - Radial error digital
RE lag - Radial error signal for LAG network
RD - Ready signal, starting up procedure finished
$\overline{\text{RPU}}$ - Radial puls after track jumping
$\overline{\text{Si}}$ - On/off control for laser supply and focus circuit
$\overline{\text{TL}}$ - Track loss signal
Vc - Control voltage for turntable motor
$\overline{\text{ATSB}}$ - Attenuation of Audio level in Search position (Cueing)
CD ROM Switch - Digital Data information on disc signal

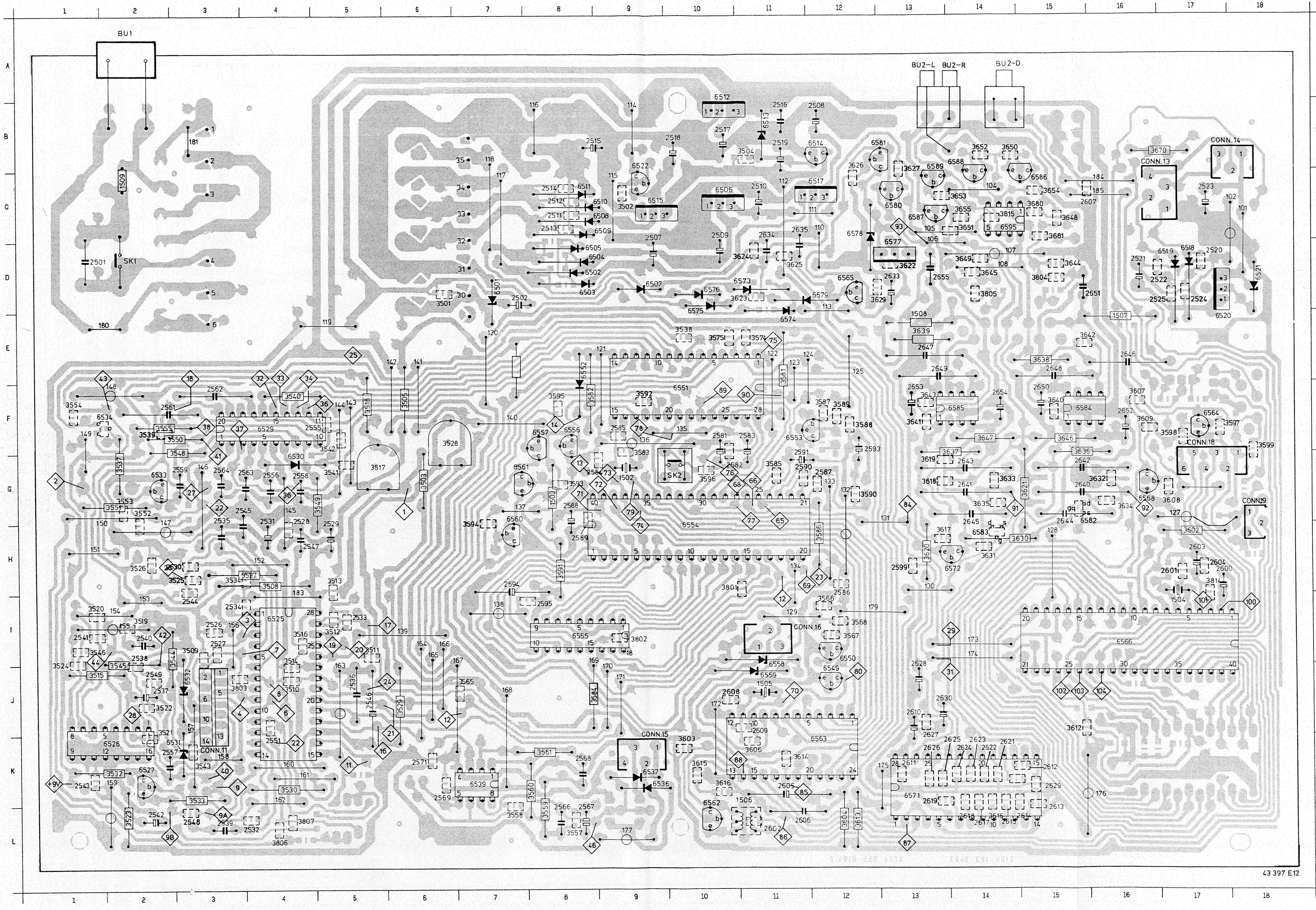
CEFM - Clock Eight-to-Fourteen Modulator
CLAB - Clock signal Decoder-A to Filter-B
$\overline{\text{CLBD}}$ - Clock signal Filter-B to DAC
$\overline{\text{CRI}}$ - Counter Reset Inhibit
DAAB - Data signal Decoder-A to Filter-B
$\overline{\text{DABD}}$ - Clock signal Filter-B to DAC
$\overline{\text{DEEM}}$ - Deemphasis
DOBM - Digital out signal
EFAB - Error flag Decoder-A to Filter-B
$\overline{\text{IREF}}$ - Reference Current
$\overline{\text{MSTP}}$ - Motor start-stop signal
$\overline{\text{MUTE}}$ - Mute signal
$\overline{\text{MUSB}}$ - Soft Mute signal
PD/OC - Phase detector - oscillator control

POR - power on reset
QCL - Q-channel Clock signal
QDA - Q-channel Data signal
QRA - Q-channel Request Acknowledge
SCAB - Subcode clock Decoder-A to Filter-B
SCLK-I^2C - Serial Clock signal Decoder-Control µP (Inter IC Connection)
SDAB - Subcode data Decoder-A to Filter-B
SDAT-I^2D - Serial Data signal Decoder-Control µP (Inter IC Connection)
SWAB/$\overline{\text{SSM}}$ - Subcode Word/Start-stop motor signal
WSAB - Word Select Decoder-A to Filter-B
WSBD - Word Select Filter-B to DAC
XIN - Oscillator signal in Decoder-A
XSYS - Oscillator signal out Filter-B

1001	J 1
1002	J 1
1003	J 1
1502	A10
2526	F 3
2527	F 3
2528	E 5
2529	E 4
2530	E 6
2531	E 5
2532	F 6
2533	F 8
2534	F 9
2535	F10
2536	H10
2537	J12
2538	J13
2539	E 7
2540	L13
2541	L13
2542	K12
2543	K13
2544	J11
2545	L 9
2546	J 4
2547	I 10
2548	J 3
2549	K13
2551	H11
2555	C17
2556	C14
2557	F21
2558	E18
2559	G18
2561	I 14
2562	I 14
2563	I 15
2564	I 15
2566	L17
2568	M16
2569	N15
2571	N14
2581	A 9
2582	A 9
2583	A 8
2584	A10
2585	A10
2599	B 3
3508	F 3
3509	F 3
3510	E 7
3511	D 6
3512	E 8
3513	E 9
3514	E 6
3515	J12
3516	F 6
3517	L12
3518	L11
3519	L14
3520	L13
3521	J13
3522	K13
3523	K12
3524	K11
3525	J11
3526	K10
3527	L11
3528	L 3
3529	K 3
3530	J 4
3532	I 3
3533	J 3
3534	F10
3536	D 8
3537	J17
3538	D11
3539	E19
3540	I 13
3541	C15
3542	D15
3543	F21
3544	G20
3545	G20
3546	F20
3548	E19
3549	F18
3550	F19
3551	G19
3552	J18
3553	J18
3554	I 17
3555	D19
3556	L17
3558	M17
3559	M16
3560	M16
3561	M16
3562	L15
3563	N17
3564	M14
3565	M14
3574	B 2
3575	B 3
3581	A 9
3582	A 7
3583	A10
3803	H 3
3806	H11
3807	G11
6525	I 5
6526	E20
6526	J12
6527	I 3
6529	D12
6530	C14
6531	F20
6532	F20
6533	J18
6534	I 17
6536	M18
6537	M18
6539	M17
6539	M15
6551	A 5
6552	A 8


SERVO
DECODER-A IC6554
DODS
HF
HFD
CONTROL μP IC6566
I²C
I²D
6551(A) MAB8441
μP
CLOCK
INT/T0
T1
RESET
XTAL1
XTAL2
Vdd
Vss
CPU
I/O PORTS
6 MHz
RE-dig
C.D.M-2
DIODE ASSEMBLY
D1
D2
D3
D4
GUARD RING PHOTODIODE
LASER ASSEMBLY
LASER
MONITOR
FLEX PRINT (FOIL)
6525 TDA5708
HF AMPLIFIER
EQUALIZER
AMPLITUDE DETECTOR
GAIN CONTROL
HF AMPLITUDE SLICERS
STARTING CIRCUIT
LASER SUPPLY
FOCUS NORMALIZING CIRCUIT
PHOTO DIODE SIGNAL PROCESSOR
LASER OUTPUT ADJ
6527 BC338
6529 TDA5709
RADIAL ERROR PROCESSOR
ROM
3½-BIT DAC
switches
INTEGRATING AMPLIFIER
OSCILLATOR 650Hz
RADIAL DRIVE
6526 -(1/2)B L272MB
RAD+
RAD-
TO RADIAL MOTOR VIA FLEX PRINT
FOCUS DRIVE
6526 -(1/2)A L272MB
FOCUS OFFSET
FOC-
FOC+
TO FOCUS MOTOR VIA FLEX PRINT
TURNTABLE MOTOR CONTROL
6539 -(1/2)A NJM4560
6539 -(1/2) NJM4560
6534 BC856
6533 BC548B
6537 1N4148
6536 BAT85
TO TURNTABLE MOTOR CIRCUIT
DECODER-A IC6554 MC
-CHIP JUMPER (0Ω)
PRS.03795
T32-805

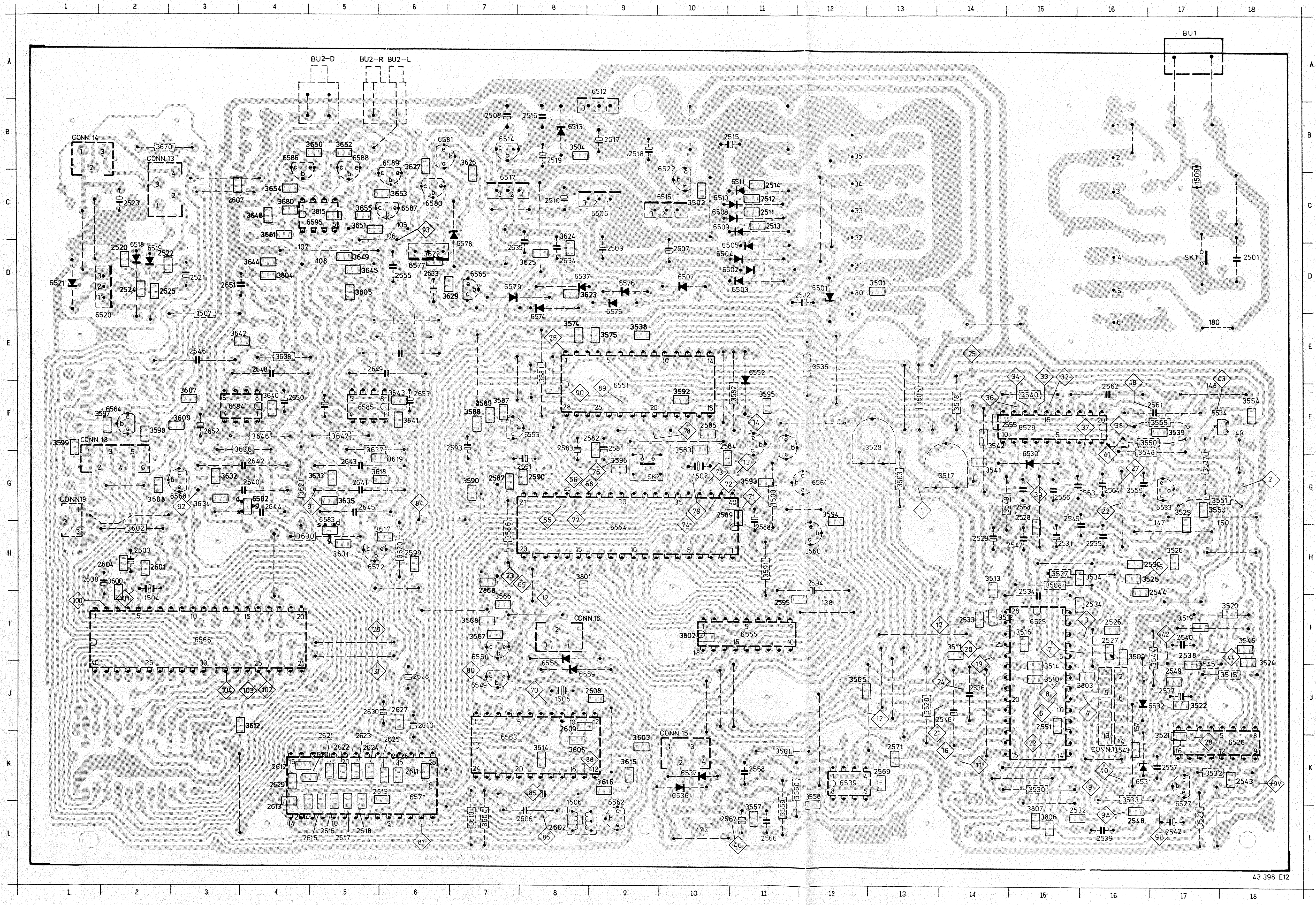
SERVO + DECODER PANEL



1502	G 9	2641	G14	3629	D13
1503	G 8	2642	G15	3630	H15
1504	I17	2643	G14	3631	H14
1505	J11	2644	G15	3632	G16
1506	K11	2645	G14	3633	G14
1507	E16	2646	E16	3634	G16
1508	E13	2647	E13	3635	G14
1509	C 2	2648	E15	3636	F15
2501	D 2	2649	E13	3637	F14
2502	D 7	2650	F15	3638	E15
2507	C 9	2651	D16	3639	E13
2508	B12	2652	F16	3640	F15
2509	C10	2653	F13	3641	F13
2510	C11	2654	F14	3642	E16
2511	I 5	2655	D13	3643	F13
2511	C 8	3501	D 6	3644	D15
2512	C 8	3502	C 9	3645	D14
2513	C 8	3503	G 6	3646	F15
2514	C 8	3504	B11	3647	F14
2515	B 9	3505	F 6	3648	C15
2516	B11	3508	H 4	3649	D14
2517	B10	3509	I 3	3650	B14
2518	B10	3510	J 4	3651	C14
2519	B11	3512	I 5	3652	B14
2520	D17	3513	H 5	3653	C14
2521	D16	3514	I 4	3654	C15
2522	D17	3515	J 1	3655	C14
2523	C17	3516	I 4	3670	B17
2524	D17	3517	G 5	3680	C15
2525	D17	3518	F 5	3681	C15
2526	I 3	3519	I 2	3801	H10
2527	I 3	3520	I 1	3802	I 9
2528	G 4	3521	J 2	3803	J 3
2529	H 5	3522	J 2	3804	D15
2530	H 3	3523	L 2	3805	D14
2531	G 4	3524	I 1	3806	L 4
2532	L 4	3525	H 3	3807	L 4
2533	I 5	3526	H 2	3814	H17
2534	I 3	3527	H 4	3815	C14
2535	G 3	3528	F 6	6501	D 7
2536	J 5	3529	J 6	6502	D 9
2537	J 2	3530	K 4	6503	D 8
2538	I 2	3532	K 2	6504	D 9
2539	L 3	3533	K 3	6505	D 9
2540	I 2	3534	H 3	6506	C10
2541	I 1	3537	G 2	6507	D 9
2542	L 2	3538	E10	6508	C 9
2543	K 1	3539	F 2	6509	C 9
2544	I 3	3540	F 4	6510	C 9
2545	G 4	3541	G 5	6511	C 8
2546	J 5	3542	F 5	6512	A10
2547	H 5	3543	K 3	6513	B11
2548	L 3	3544	I 2	6514	B12
2549	J 2	3545	I 2	6515	C 9
2551	K 4	3546	I 1	6517	C12
2555	F 5	3548	F 3	6518	D17
2556	G 4	3549	G 5	6519	D17
2557	K 2	3550	F 3	6520	E17
2558	G 4	3551	G 2	6521	D18
2559	G 3	3552	G 2	6522	B 9
2561	F 2	3553	G 2	6525	I 4
2562	F 3	3554	F 1	6526	K 2
2563	G 4	3555	F 2	6527	K 2
2564	G 3	3557	L 8	6529	F 4
2566	K 8	3558	L 7	6530	G 4
2567	L 8	3559	L 8	6531	K 2
2568	K 8	3560	K 8	6532	J 3
2569	K 6	3561	K 8	6533	G 2
2571	K 6	3565	J 7	6534	F 2
2581	F10	3566	I12	6536	K 9
2583	F11	3567	I12	6537	K 9
2584	G 9	3568	I12	6539	K 7
2585	F 9	3574	E11	6549	J12
2586	H12	3575	E10	6550	I12
2586	G10	3581	E11	6551	F10
2587	G12	3582	F 9	6552	E 8
2588	G 8	3583	F 9	6553	F11
2589	H 8	3584	J 9	6554	H10
2590	G11	3585	G11	6555	I 8
2591	F11	3586	H12	6556	F 8
2593	F12	3587	F12	6557	F 8
2594	H 7	3588	F12	6558	I11
2595	I 8	3589	F12	6559	J11
2599	H13	3590	G12	6560	G 7
2600	H17	3591	H 8	6561	G 7
2601	H17	3592	F 9	6562	K10
2602	L11	3593	G 8	6563	K12
2603	H17	3594	H 7	6564	F17
2604	H17	3595	F 8	6565	D12
2605	K11	3596	G10	6566	I16
2606	L11	3597	F18	6568	G16
2607	C16	3598	F17	6571	K13
2608	J10	3599	F18	6572	H14
2609	J11	3602	H17	6573	D11
2610	J13	3603	K10	6574	E11
2611	K13	3604	L12	6575	D10
2613	L15	3606	K11	6576	D10
2614	L15	3607	F16	6577	D13
2615	L14	3608	G17	6578	C12
2616	L14	3609	F16	6579	D12
2617	L14	3612	K15	6580	C13
2618	L14	3612	J15	6581	B13
2619	K13	3613	L12	6582	G16
2621	K14	3614	K11	6583	H14
2622	K14	3615	K10	6584	F15
2623	K14	3616	K10	6585	F14
2624	K14	3617	H13	6586	C15
2625	K14	3618	G13	6587	C13
2626	K13	3619	G13	6588	B14
2627	J13	3620	H13	6589	B13
2628	I13	3621	G15	6595	C14
2629	K15	3622	D13	BU 1	A 2
2630	J13	3623	D11	BU 2	A13
2633	D13	3624	D11	SK 1	D 2
2634	C11	3625	D11	SK 2	G10
2635	C11	3626	B12		
2640	G15	3627	B13		

PRS.03951

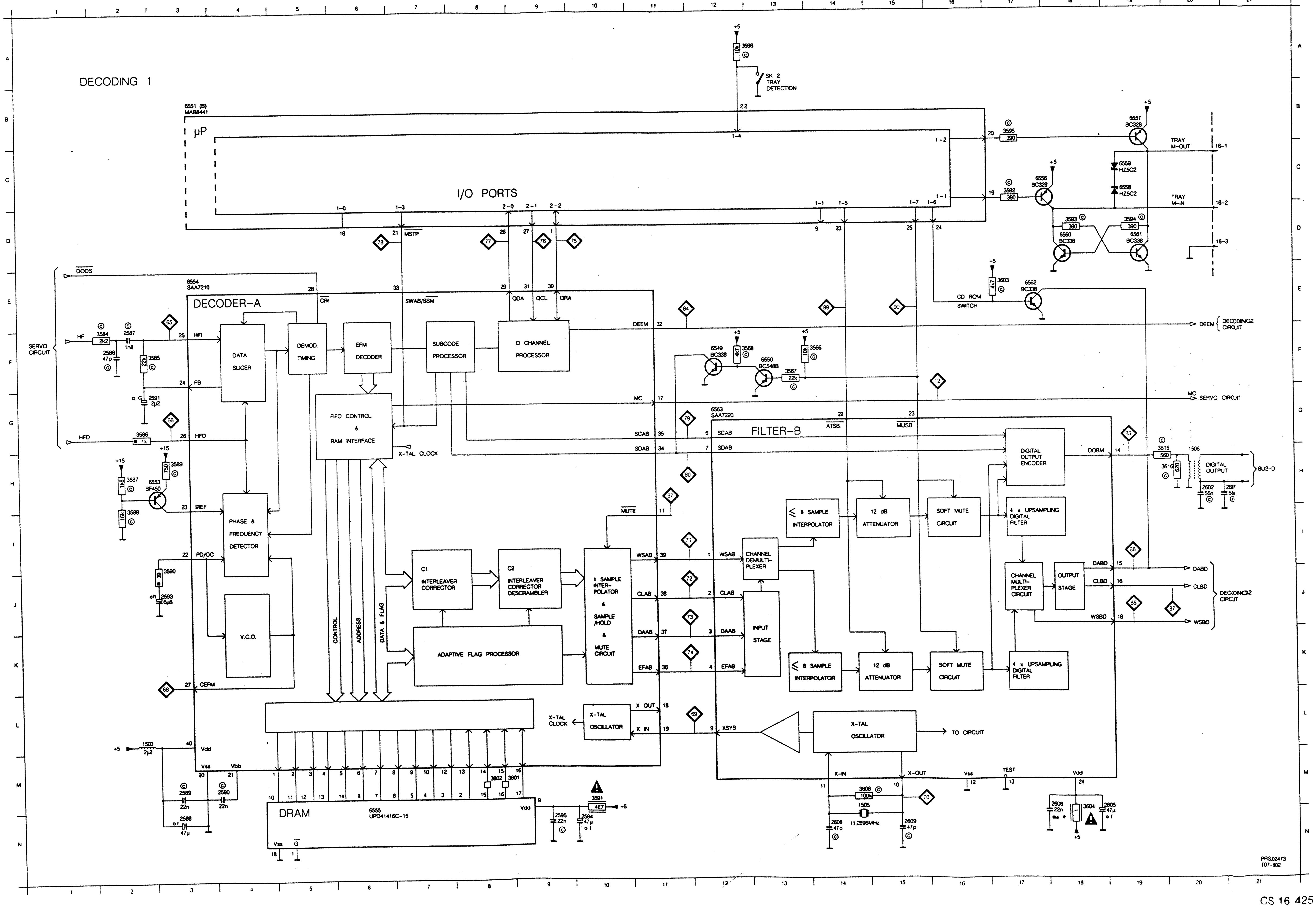
SERVO + DECODER PANEL



PRS.03952

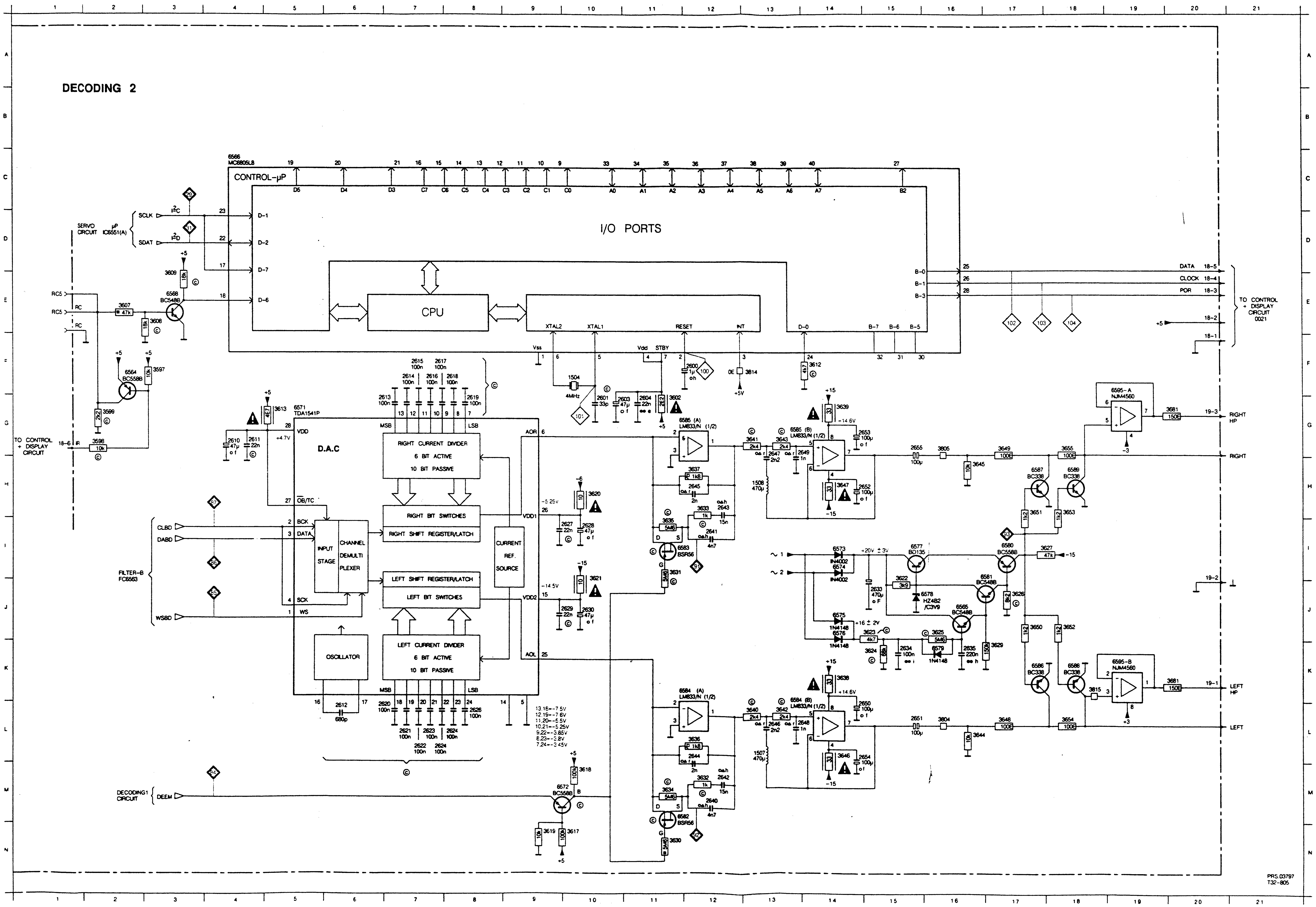
1502	G10	2641	G 5	3632	G 3
1503	G11	2642	G 4	3633	G 5
1504	I 2	2643	G 5	3634	G 3
1505	J 8	2644	G 4	3635	G 5
1506	L 8	2645	G 5	3636	G 4
1507	E 3	2648	E 4	3637	G 5
1509	B17	2649	E 6	3638	E 4
2501	D18	2650	F 4	3640	F 4
2502	D12	2651	D 3	3641	F 6
2507	D10	2652	F 3	3642	E 4
2508	B 7	2653	F 6	3643	F 6
2509	D 9	2655	D 6	3644	D 4
2510	C 8	2868	I 7	3645	D 5
2511	C11	3501	D13	3646	F 4
2512	C11	3502	C10	3647	F 5
2513	C11	3503	G13	3648	C 4
2514	C11	3504	B 8	3649	D 5
2515	B11	3505	F13	3650	B 5
2516	B 8	3508	H15	3651	C 5
2517	B 9	3509	I16	3652	B 5
2518	B 9	3510	J15	3653	C 6
2519	B 8	3511	I14	3654	C 4
2520	D 2	3512	I14	3655	C 5
2521	D 3	3513	H14	3670	B 2
2522	D 2	3514	J15	3680	C 4
2523	C 2	3515	J18	3681	D 4
2524	D 2	3516	I15	3801	H 9
2525	D 2	3517	G14	3802	I10
2526	I16	3518	F14	3803	J16
2527	I16	3519	I17	3804	D 4
2528	G15	3520	I18	3805	D 5
2529	H14	3521	J17	3806	L15
2530	H17	3522	J17	3807	L15
2531	H15	3523	L17	3815	C 5
2532	L15	3525	G17	6501	D12
2533	I14	3525	H17	6502	D11
2534	H15	3526	H17	6503	D11
2534	I16	3527	H15	6504	D10
2535	H16	3528	F13	6505	D11
2536	J14	3529	J13	6506	C 9
2537	J17	3530	K15	6507	D10
2538	I17	3532	K17	6508	C10
2539	L16	3533	K16	6509	C10
2540	I17	3534	H16	6510	C10
2542	L17	3536	E12	6511	C11
2543	K18	3537	G17	6512	A 9
2544	H17	3538	E 9	6513	B 8
2545	G16	3539	F17	6514	B 7
2546	E 3	3540	F15	6515	C10
2546	J14	3541	G14	6517	C 7
2547	H15	3542	F14	6518	D 2
2548	L16	3544	I17	6519	D 2
2549	J17	3545	I17	6520	E 2
2551	J15	3546	I18	6521	D 1
2555	F15	3548	F17	6522	B10
2556	G15	3549	G14	6525	I15
2557	K17	3550	F16	6526	K18
2558	G15	3551	G18	6527	K17
2559	G15	3553	G17	6529	F15
2561	F17	3554	F18	6530	F15
2562	F16	3555	F17	6531	K16
2563	G16	3557	L11	6532	J17
2564	G16	3558	K12	6533	G17
2566	L11	3559	L11	6534	F18
2567	L11	3560	K12	6535	K10
2568	K11	3561	K11	6537	D 8
2569	K13	3565	J12	6537	K10
2571	K13	3566	I 7	6539	K12
2581	F 9	3567	I 7	6549	J 7
2582	F 9	3568	I 7	6550	I 7
2583	F 8	3574	E 8	6551	F 9
2584	F10	3575	E 9	6552	E11
2585	F10	3581	E 8	6553	F 8
2587	G 7	3582	F11	6554	H 9
2588	H11	3583	F10	6555	I11
2589	G10	3586	H 7	6558	J 8
2590	G 8	3587	F 7	6559	J 9
2591	G 8	3588	F 7	6560	H12
2593	F 7	3589	F 7	6561	G12
2594	H12	3590	G 7	6562	L 9
2595	I11	3591	H11	6563	K 7
2599	H 6	3592	F10	6564	F 2
2600	H 1	3593	G11	6565	D 7
2601	H 2	3594	G12	6566	I 3
2602	L 8	3595	F11	6568	G 3
2603	H 2	3596	G 9	6571	K 6
2604	H 2	3597	F 2	6572	H 5
2606	L 8	3598	F 2	6574	E 8
2607	C 3	3599	F 1	6575	D 9
2608	J 9	3600	H 2	6576	D 9
2609	J 8	3602	H 2	6577	D 6
2610	J 6	3603	K 9	6578	D 7
2611	K 6	3604	L 7	6579	D 7
2612	K 4	3606	K 8	6580	C 6
2613	L 4	3607	F 3	6581	B 6
2614	L 4	3608	G 2	6582	G 4
2615	L 5	3609	F 3	6583	H 5
2616	K 6	361	L 7	6584	F 3
2616	L 5	3612	J 4	6585	F 5
2617	L 5	3614	K 8	6586	B 4
2618	L 5	3615	K 9	6587	C 6
2619	K 6	3616	K 9	6588	B 5
2620	K 5	3617	H 6	6589	B 6
2621	K 5	3618	G 6	6595	C 5
2622	K 5	3619	G 6	BU 1	A17
2623	K 5	3620	H 6	BU 2	A 5
2624	K 5	3621	G 4	SK 1	D17
2625	K 6	3622	D 6	SK 2	G 9
2627	J 6	3623	D 9		
2628	J 6	3624	C 8		
2629	K 4	3625	D 8		
2630	J 5	3626	B 7		
2633	D 6	3627	B 6		
2634	D 8	3629	D 7		
2635	D 8	3630	H 4		
2640	G 4	3631	H 5		

Part	Location
1503	L 2
1505	M14
1506	H20
2586	F 2
2587	F 2
2588	N 3
2589	M 3
2590	M 4
2591	G 3
2593	J 3
2594	N10
2595	N 9
2602	H20
2605	M19
2606	M18
2607	H21
2608	N14
2609	N15
3566	F14
3567	F13
3568	F13
3584	F 2
3585	F 3
3586	G 2
3587	H 2
3588	H 2
3589	H 3
3590	I 3
3591	M10
3592	C17
3593	D18
3594	D19
3595	B17
3596	A13
3603	E17
3604	N18
3606	M14
3615	H19
3616	H20
3801	M 8
3802	M 8
6549	F12
6550	F13
6551	B 3
6553	H 3
6554	E 3
6555	M 6
6556	C17
6557	B19
6558	C19
6559	C19
6560	D18
6561	D19
6562	E17
6563	G12
SK 2	A13


DECODING 1
6551 (B)
MAB8441
μP
I/O PORTS
SK 2
TRAY
DETECTION
3596
10k
6557
BC328
6556
BC328
3595
390
3592
390
6559
HZ5C2
6558
HZ5C2
3593
390
3594
390
6560
BC338
6561
BC338
TRAY
M-OUT
TRAY
M-IN
16-1
16-2
16-3
3603
4k7
6562
BC338
CD ROM
SWITCH
6554
SAA7210
DECODER-A
DODS
SERVO
CIRCUIT
HF
3584
2k2
2587
1n8
2586
47p
3585
22k
2591
2μ2
HFD
3586
1k
HFI
FB
DATA
SLICER
DEMOD.
TIMING
EFM
DECODER
SUBCODE
PROCESSOR
Q CHANNEL
PROCESSOR
CRI
MSTP
SWAB/SSM
QDA
QCL
QRA
DEEM
MC
SCAB
SDAB
FIFO CONTROL
&
RAM INTERFACE
X-TAL CLOCK
3587
1k8
3588
16k
6553
BF450
3589
750
IREF
PHASE &
FREQUENCY
DETECTOR
PD/OC
3590
39
2593
6μ8
V.C.O.
CEFM
CONTROL
ADDRESS
DATA & FLAG
C1
INTERLEAVER
CORRECTOR
C2
INTERLEAVER
CORRECTOR
DESCRAMBLER
ADAPTIVE FLAG PROCESSOR
1 SAMPLE
INTER-
POLATOR
&
SAMPLE
/HOLD
&
MUTE
CIRCUIT
MUTE
WSAB
CLAB
DAAB
EFAB
X-TAL
CLOCK
X-TAL
OSCILLATOR
X OUT
X IN
1503
2μ2
Vdd
Vss
Vbb
2589
22n
2590
22n
2588
47μ
DRAM
6555
UPD41416C-15
3802
3801
3591
4E7
2595
22n
2594
47μ
Vss
G
6549
BC338
3568
4k7
6550
BC548B
3567
22k
3566
10k
6563
SAA7220
FILTER-B
ATSB
MUSB
DIGITAL
OUTPUT
ENCODER
DOBM
3615
560
3616
620
1506
DIGITAL
OUTPUT
BU2-D
2602
56n
2607
56n
≤ 8 SAMPLE
INTERPOLATOR
12 dB
ATTENUATOR
SOFT MUTE
CIRCUIT
4 x UPSAMPLING
DIGITAL
FILTER
CHANNEL
DEMULTI-
PLEXER
INPUT
STAGE
CHANNEL
MULTI-
PLEXER
CIRCUIT
OUTPUT
STAGE
DABD
CLBD
WSBD
DEEM
DECODING2
CIRCUIT
MC
SERVO CIRCUIT
XSYS
X-TAL
OSCILLATOR
TO CIRCUIT
X-IN
X-OUT
TEST
3606
100k
1505
11,2896MHz
2608
47p
2609
47p
2606
22n
3604
2605
47μ
PRS 02473
T07-802

1504 F10	2603 G11	2613 G 7	2618 F 8	2623 L 7	2628 I 10	2635 K16	2644 L12	2649 G14	2654 L15	3602 G11	3613 G 5	3621 I 10	3626 J17	3632 M12	3637 H12	3642 L13	3647 H14	3652 J18	3681 K20	6564 F 2	6572 M10	6577 I 15	6582 M12	6585 G12	6595 F19
1507 L13	2604 G11	2614 F 7	2619 G 8	2624 L 7	2629 J10	2640 M12	2645 H12	2650 L15	2655 G15	3607 E 2	3617 N10	3622 I 15	3627 I 18	3633 H12	3638 K14	3643 G13	3648 L17	3653 H18	3804 L16	6565 J16	6573 I 14	6578 J16	6583 I 12	6586 K17	6595 K19
1508 H13	2610 G 4	2615 F 7	2620 L 7	2624 L 8	2630 J10	2641 I 12	2646 L13	2651 L15	3597 F 3	3608 E 3	3618 M10	3623 J15	3629 K17	3634 M11	3639 G14	3644 L16	3649 G17	3654 L18	3805 G16	6566 C 4	6574 I 14	6579 K16	6584 K13	6587 H17	
2600 F12	2611 G 4	2616 F 7	2621 L 7	2626 L 8	2633 J15	2642 M12	2647 G13	2652 H15	3598 G 2	3609 E 3	3619 N 9	3624 K15	3630 N11	3635 I 11	3640 L13	3645 H16	3650 J17	3655 G18	3814 F13	6568 E 3	6575 J14	6580 I 17	6584 K12	6588 K18	
2601 G10	2612 L 6	2617 F 7	2622 L 7	2627 I 10	2634 K15	2643 H12	2648 L14	2653 G15	3599 G 2	3612 F14	3620 H10	3625 J16	3631 I 11	3636 L12	3641 G13	3646 L14	3651 H17	3681 G20	3815 K18	6571 G 5	6576 J14	6581 I 17	6585 G13	6589 H18	

DECODING 2


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
A
B
C
D
E
F
G
H
I
J
K
L
M
N
6566
MC6805L8
CONTROL-µP
I/O PORTS
CPU
D5
D4
D3
C7
C6
C5
C4
C3
C2
C1
C0
A0
A1
A2
A3
A4
A5
A6
A7
B2
D-1
D-2
D-7
D-6
B-0
B-1
B-3
D-0
B-7
B-6
B-5
XTAL2
XTAL1
RESET
INT
Vss
Vdd
STBY
SERVO CIRCUIT
µP IC6551(A)
SCLK
SDAT
I²C
I²D
RC5
RC
6568 BC548B
6564 BC558B
3607 47k
3608 18k
3609 18k
3597 10k
3599 2k2
3598 10k
TO CONTROL + DISPLAY CIRCUIT
18-6
IR
1504 4MHz
2601 33p
2603 47µ
2604 22n
3602 3E3
2600 1µ
3814
3612 4k7
DATA 18-5
CLOCK 18-4
POR 18-3
18-2
18-1
TO CONTROL + DISPLAY CIRCUIT 0021
102
103
104
100
101
6571 TDA1541P
D.A.C
VDD
OB/TC
BCK
DATA
SCK
WS
INPUT STAGE
CHANNEL DEMULTI PLEXER
RIGHT CURRENT DIVIDER
6 BIT ACTIVE
10 BIT PASSIVE
RIGHT BIT SWITCHES
RIGHT SHIFT REGISTER/LATCH
LEFT SHIFT REGISTER/LATCH
LEFT BIT SWITCHES
LEFT CURRENT DIVIDER
CURRENT REF. SOURCE
OSCILLATOR
MSB
LSB
AOR
AOL
VDD1
VDD2
-5.25V
-14.5V
+4.7V
2610 47µ
2611 22n
2612 680p
3613 4E7
3620 10
3621 10
FILTER-B FC6563
CLBD
DABD
WSBD
DECODING1 CIRCUIT
DEEM
6572 BC558B
3617 100k
3618 100k
3619 10k
13.16--7.5V
12.15--7.6V
11.20--5.5V
10.21--5.25V
9.22--3.85V
8.23--3.8V
7.24--3.45V
6585 (A) LM833/N (1/2)
6585 (B) LM833/N (1/2)
6584 (A) LM833/N (1/2)
6584 (B) LM833/N (1/2)
6583 BSR56
6582 BSR56
1508 470µ
1507 470µ
3637 1k8
3636 1k8
3635 5M6
3634 5M6
3631 5M6
3630 5M6
-14.6V
+14.6V
2655 100µ
2651 100µ
3805
3804
3649 100E
3648 100E
3655 100E
3654 100E
3645 10k
3644 10k
6587 BC338
6589 BC338
6586 BC338
6588 BC338
6595-A NJM4560
6595-B NJM4560
3681 150E
RIGHT HP
RIGHT
LEFT HP
LEFT
19-3
19-2
19-1
6573 IN4002
6574 IN4002
6575 1N4148
6576 1N4148
6577 BD135
6578 HZ4B2 /C3V9
6579 1N4148
6580 BC558B
6581 BC548B
6565 BC548B
+20V ± 3V
+16 ± 2V
2633 470µ
3622 3k9
3623 4k7
3624 68k
3625 5M6
3627 47k
3626 8k2
3629 150k
3651 1k2
3653 1k2
3650 1k2
3652 1k2
3815
~ 1
~ 2
PRS.03797
T32-805